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ABSTRACT

Designed to supplement a basic life science or biology program, this document provides teachers with experiential learning activities dealing with the human body. The learning activities vary in the length of time needed for their completion, and require a minimum of equipment and materials. The activities focus on: (1) the human skeleton; (2) systems of the human body; (3) the relationship of certain tissues to specific organs; (4) basic concepts of blood and blood-related diseases; (5) the various sensory capabilities relating to touch, hearing, tasting, smelling, and seeing; (6) a virus invasion of a bacterial cell; (7) the nervous system (including a brain "map"); (8) human nutrition and the foods we eat; and (9) the leading causes of death. Included are reproducible handouts, quizzes, self-checks, and an answer key. (TW)

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A Good GA Apple Science Activity Book for Grades 5-8

# SUPERIFIC SCIENCE

ED279504

## BOOK IV
## Learning About the Human Body

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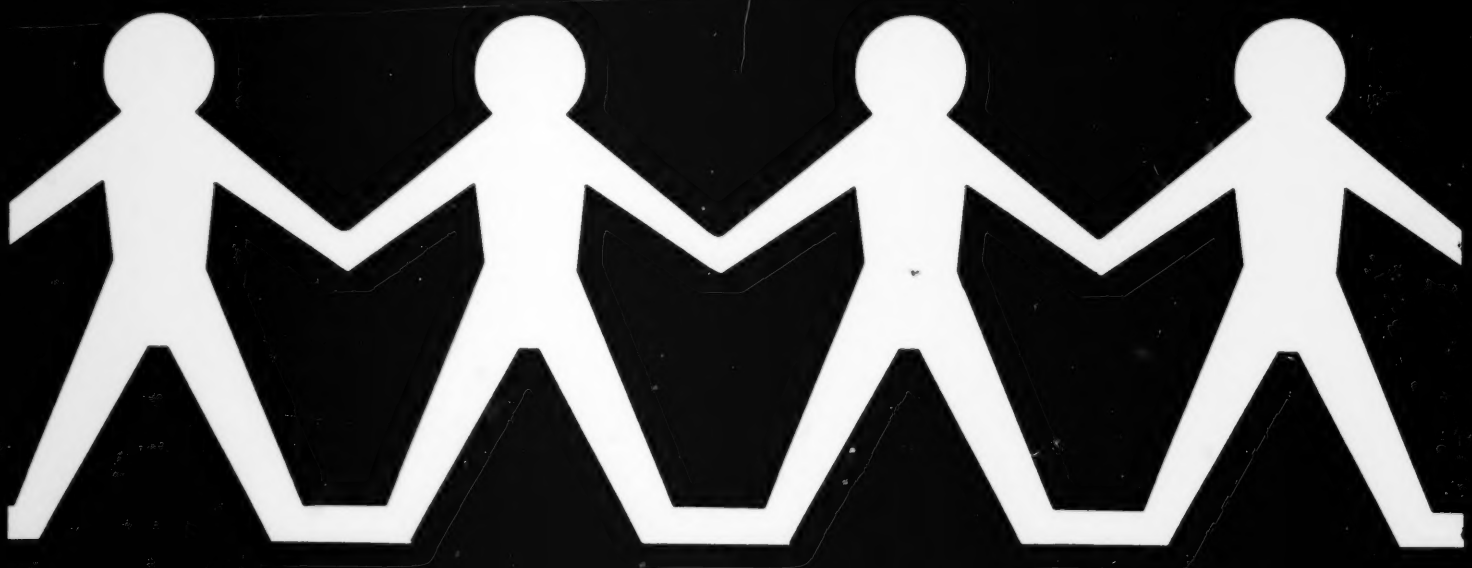

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Written by Lorraine Conway

Illustrated by Linda Akins

**SUPERIFIC SCIENCE**

**THE HUMAN BODY**

by

LORRAINE CONWAY

illustrated by Linda Akins

Cover illustrated by Nancee Volpe

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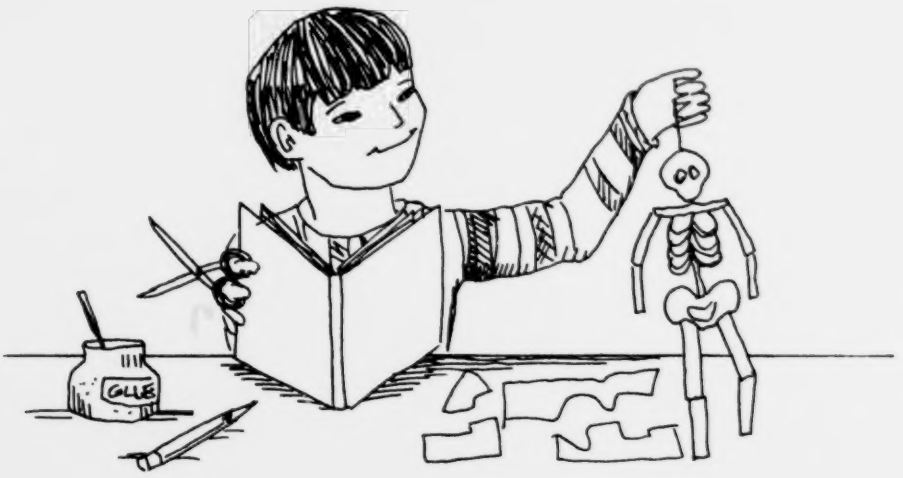
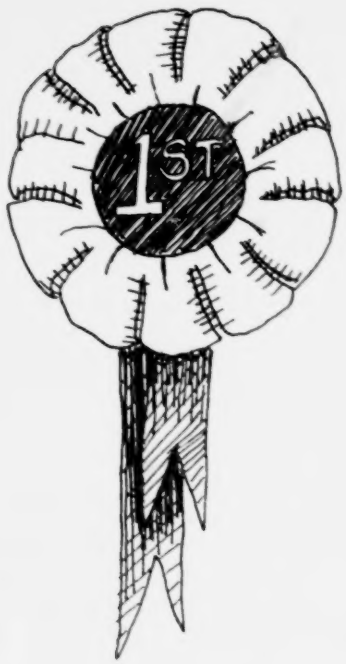
## INTRODUCTION

PURPOSE: In the middle and junior high school program activities for biology and life science classes often present special problems because many schools are not equipped with laboratories and elaborate equipment. This book, Superific Science - The Human Body, requires little, if any expensive materials or time consuming advanced preparations. At the same time, concepts concerning the human body come to life by means of active participation in a variety of learning experiences. The book is designed to stimulate interest, to arouse curiosity, and to simplify rather than to complicate biological truths.

The activities vary in the length of time needed for their completion, some taking only a few minutes while others require more time. Used in conjunction with a basic life science and biology program the activities will provide opportunities for the students to explore through **experience** rather than to learn by vicarious memorization of factual material.

Active participation enhances the imaginative process by which all meaningful learning takes place. Thus, the concepts of the human body's functions become an integral part of the students' lives.



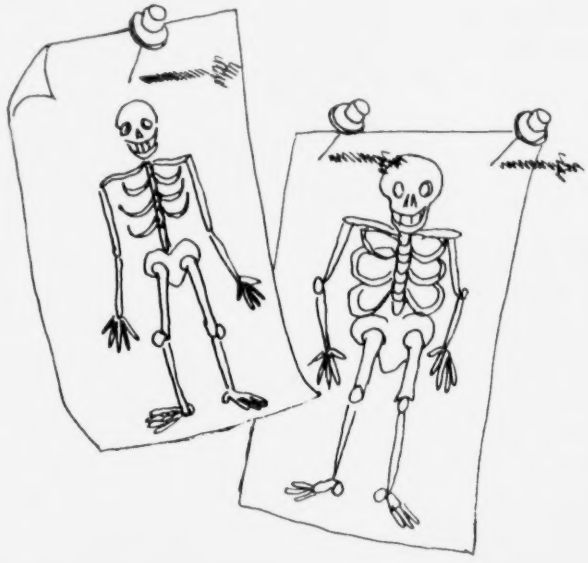


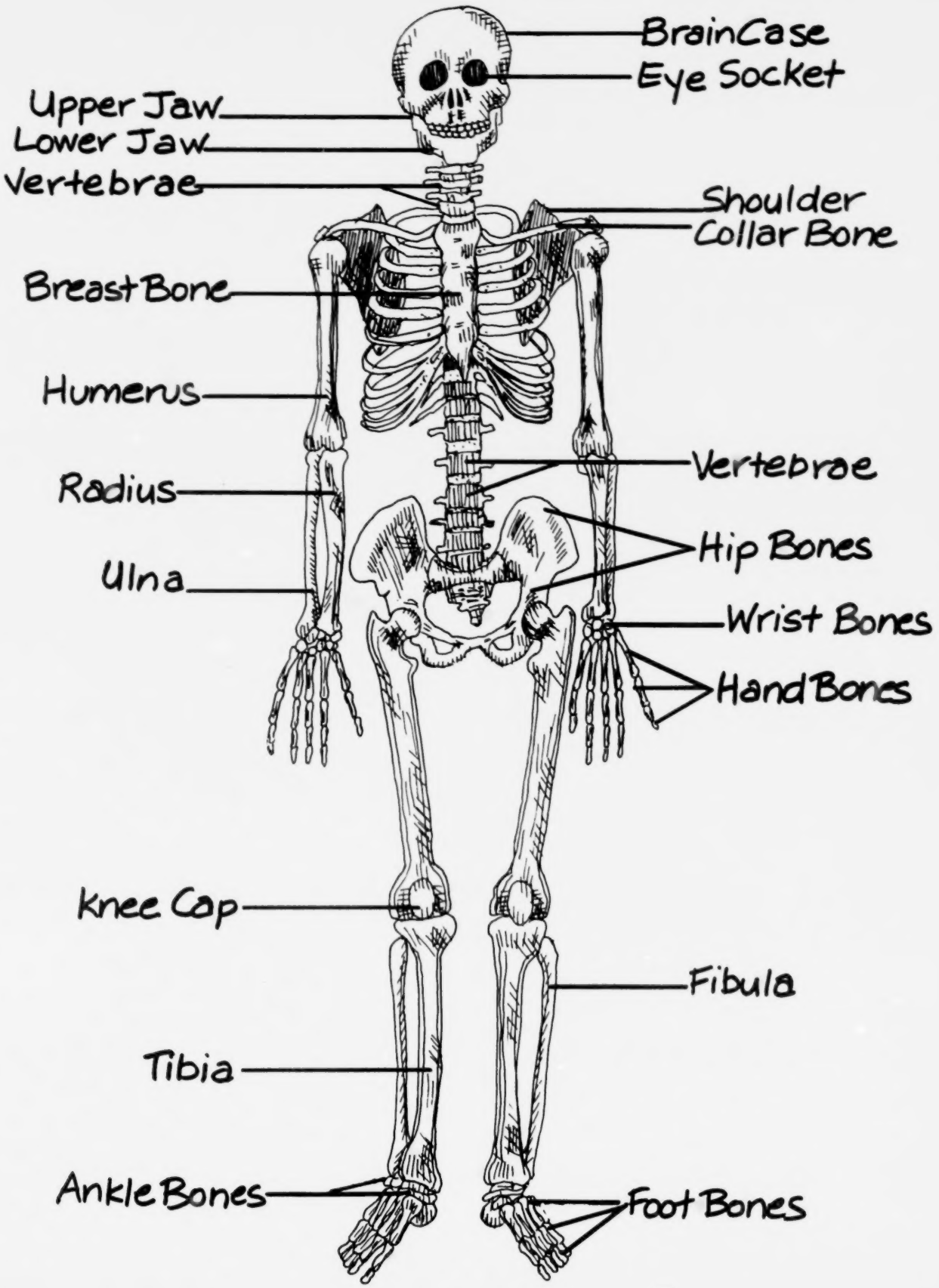

## SKELETON DRAWING CONTEST

PURPOSE: A good way to begin the study of the skeleton is by having a skeleton drawing contest. This gives the students some idea of the number and shapes of the bones, their attachment, and position.

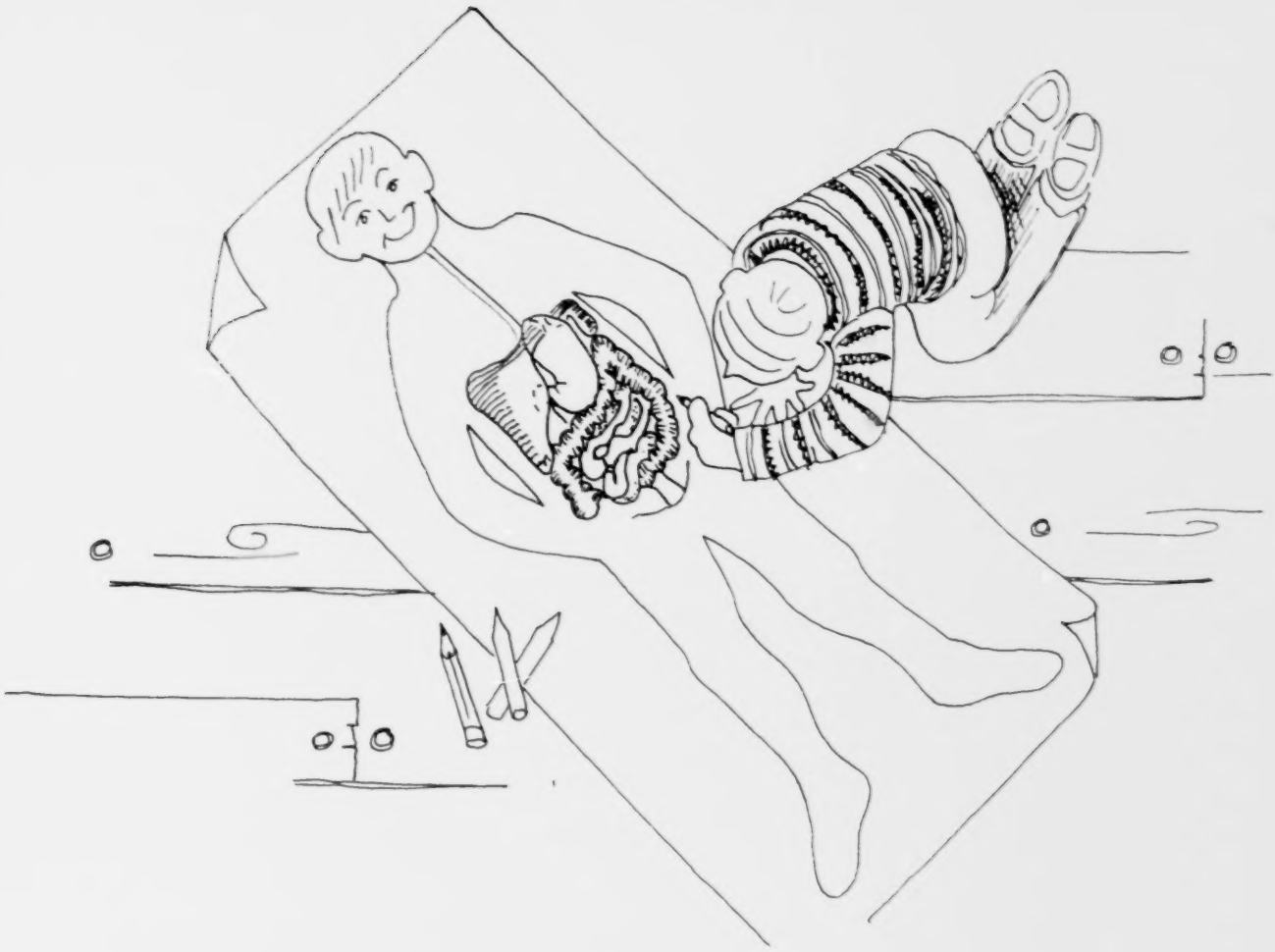
MATERIALS: A skeleton if possible, but a cardboard Halloween skeleton hung on the wall will work quite well. If these are not available, a textbook drawing can be used. An impartial judge(s) is also needed. Pencils and paper for each student are also needed. You could use the drawing on the next page as your model. Make a transparency and project on the wall using an overhead projector.

PROCEDURE: To begin the study of the skeletal system have a skeletal drawing contest. You may wish to allow a specific amount of time for the students to complete their drawings.




BrainCase
Eye Socket
Upper Jaw
Lower Jaw
Vertebrae
Shoulder
Collar Bone
Breast Bone
Humerus
Vertebrae
Radius
Hip Bones
Ulna
Wrist Bones
Hand Bones
Knee Cap
Fibula
Tibia
Ankle Bones
Foot Bones

7



## YOUR BODY SYSTEMS

PURPOSE: To add a personal note to the study of the systems of the human body.

MATERIALS: 36-inch wide, roll paper in white or a pale color, magic markers, scissors.

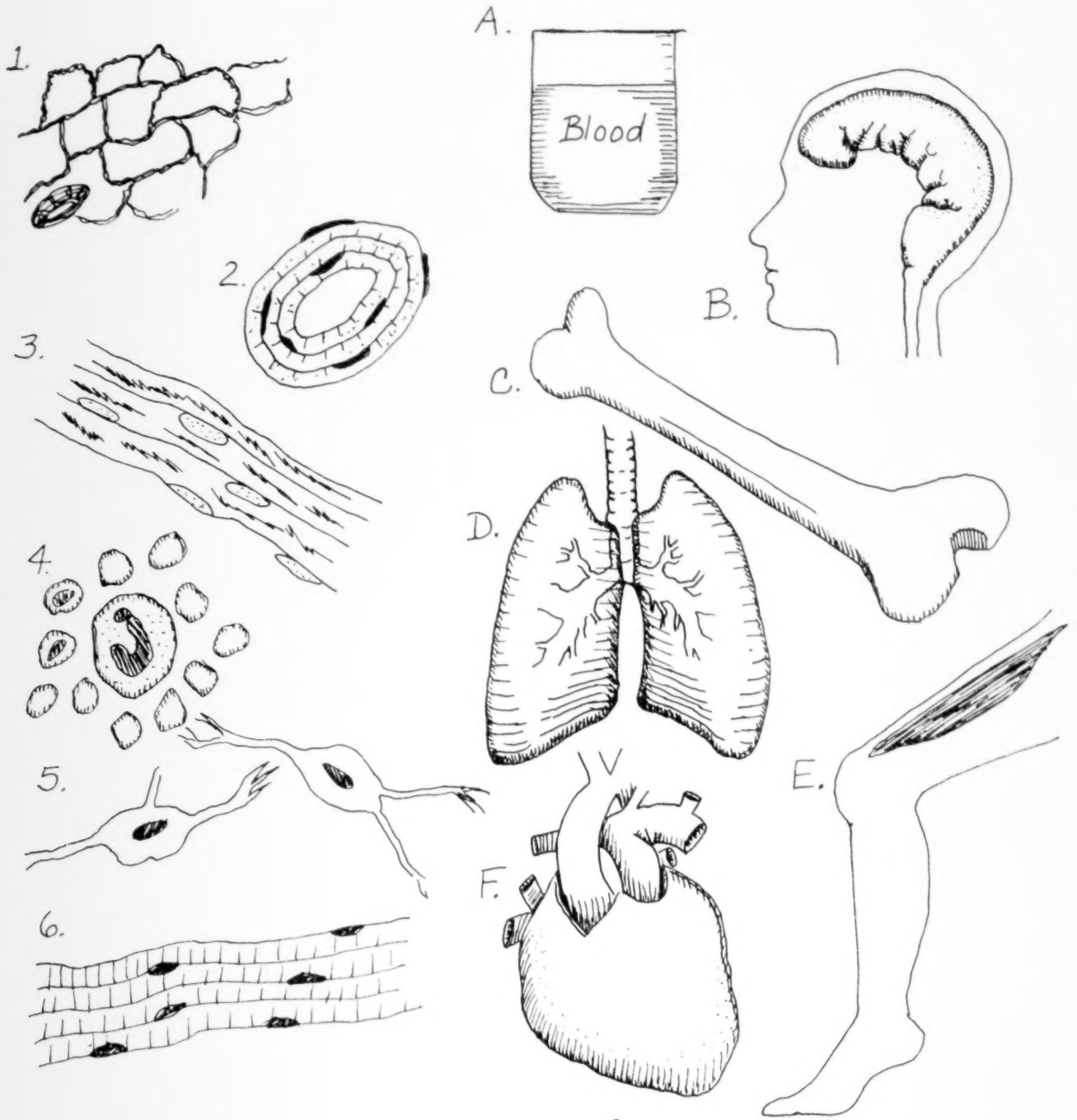
PROCEDURE: A piece of roll paper is cut off corresponding to the height of the student. Allow for extra six inches of paper at each end of the cut piece. The paper is spread on the floor with student lying on the paper. A second student outlines the form of the first student with a black magic marker. The first student then uses his outline for filling in a system of the body.

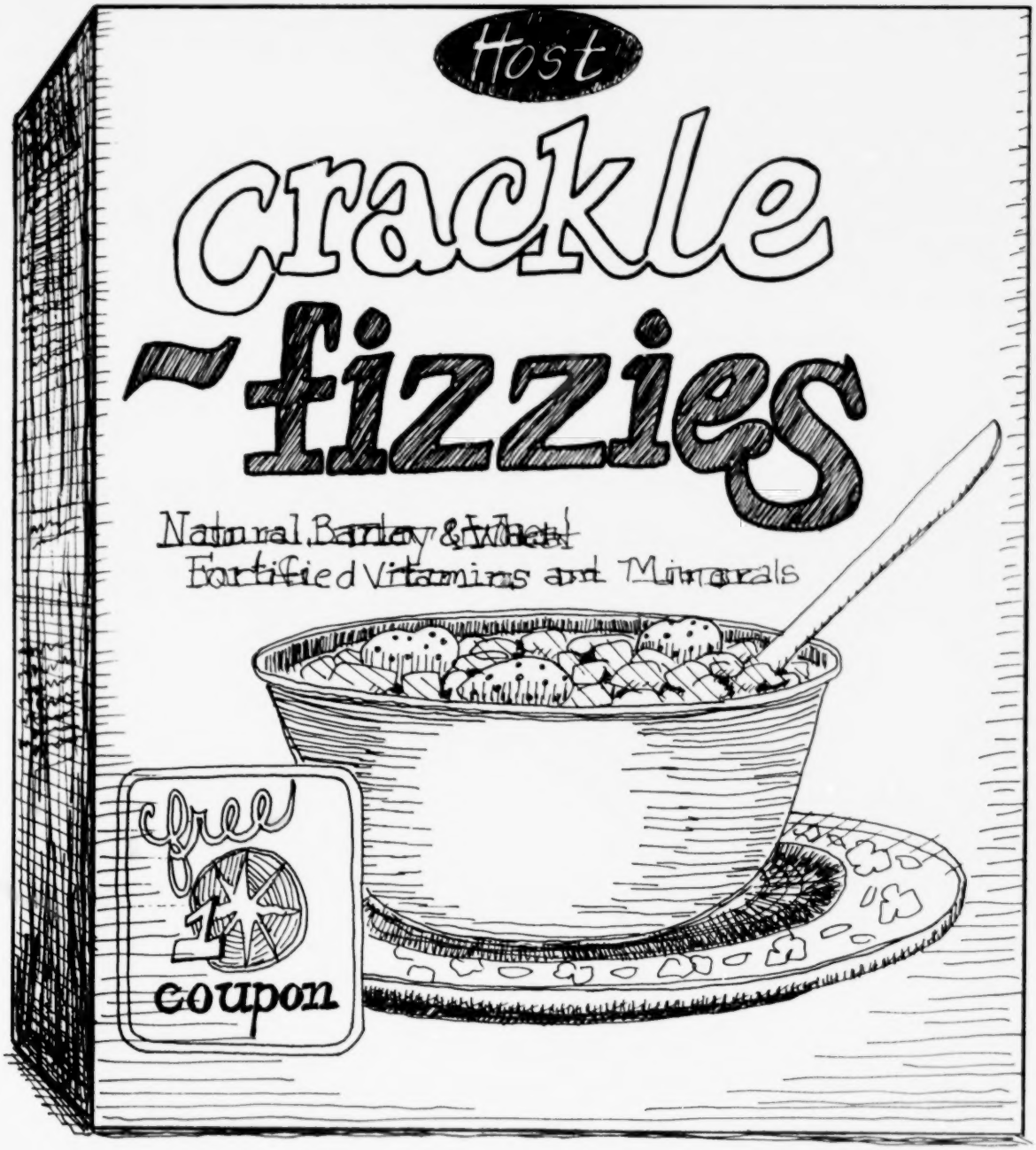
## MATCH THE TISSUE TO THE ORGAN

PURPOSE: To show that a group of similar tissues make up an organ. To determine whether or not the student can match the tissue to the organ from which it came.

MATERIALS: Pictures, slides, or drawing of tissues and the organs which they comprise.

PROCEDURE: Match the tissue to the organ by indicating with a letter answer or by drawing lines from the tissue to the organ it composes.






DO YOU KNOW WHAT YOU EAT?

Ingredients: Sugar-coated grains, water added, artificial preservatives included, artificially colored, mold and mildew retardants, artificial vitamin C added.

## DO YOU KNOW WHAT YOU EAT?

1. Do you read the list of ingredients on the packaged foods you eat? _____

2. Look at the picture of the box of Crackle-Fizzies. What is the idea that the picture is trying to get across to the buyer concerning the product?

   _____

3. Which ingredients listed on the package are not really food? _____

   _____

4. Which ingredients sound "scientific?" _____

   _____

5. What natural breakfast food could be used to supply the vitamin C mentioned on the package? _____

   _____

6. Design a food package with all natural ingredients.
7. Bring to class the ingredient list of a food you eat. Compare with your classmates' lists.
8. What do you think the expression "junk-food" means?

   _____

9. Look for "junk-foods" in your home. Carefully read the list of ingredients. What makes a food a "junk-food?" _____

   _____

10. Look for the price and the weight on a package of "junk-food." Price: _____ Weight: _____
11. If the weight is not in ounces, convert it to ounces (16 = one pound). Number of ounces: ____
12. Divide the price by the number of ounces to get the price per ounce. The price per ounce is: _____
13. Compare the price per ounce of your package of "junk-food" to the price per ounce of fruit, meat, or a vegetable in season. Meat: _____, fruit: _____, vegetable: _____

## WHAT IS SICKLE CELL ANEMIA?

PURPOSE: To give students a better idea of the sickle cell anemia syndrome.

MATERIALS: Round hole puncher, two baby food jars, red construction paper.

PROCEDURE: Punch 200 round circles, put into baby food jar and label A. Punch 100 more round red circles and put into second jar. Now punch 100 portions of circles by using the hole puncher over the edges of the holes made by the complete circles. The portion of circles should look like this ) with sharp pointed edges. Place the portions of circles into the jar with the 100 complete circles. Label this jar B. These circles and pieces of circles are abnormal (sickle). Cap jars and shake. The students empty the contents of each jar onto separate pieces of white paper. Then the following questions can be answered.

1. What are some of the functions of red blood cells?

   _____

   _____

2. What shape do the abnormal cells resemble? _____

   _____

3. Which cells have the ability to carry more oxygen?

   _____

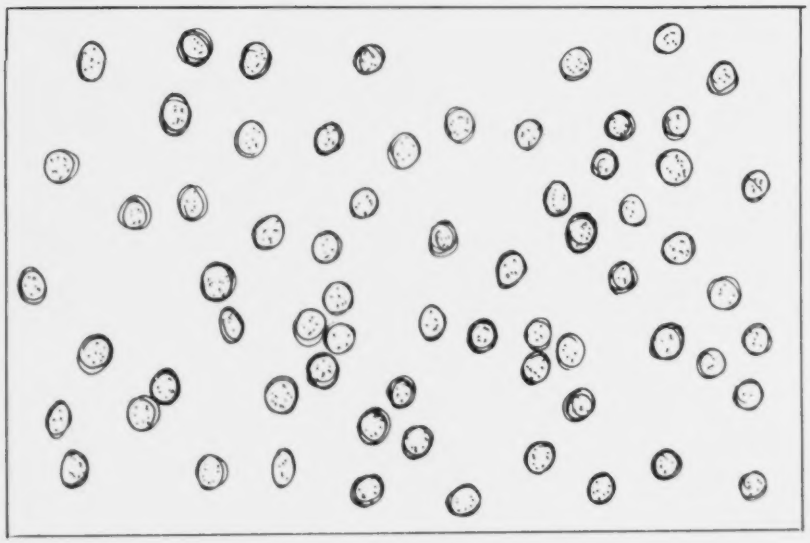
4. Which cells have more surface area? _____

5. How do you think a person "feels" when his blood does not carry enough oxygen? _____

   _____

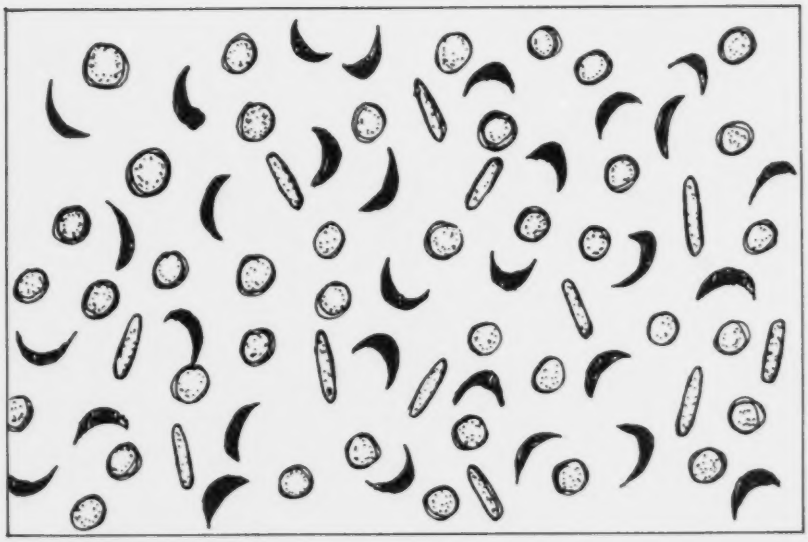
6. Compare the shapes of the normal cells to the sickle-shaped cells. Do you think the sickle-shaped cells may present a problem in traveling through the capillaries where cells pass one at a time? Why? _____

   _____



NORMAL CELLS

SICKLE CELLS

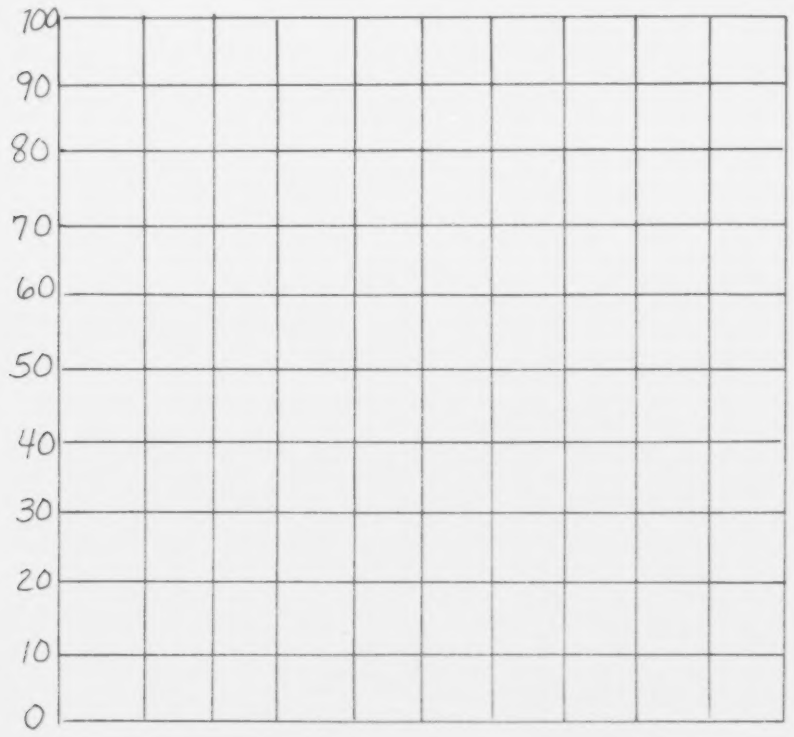


## COMPOSITION OF BLOOD

PURPOSE: To show at a glance some of the components of human blood.

MATERIALS: Graph paper or ditto sheet, pen, pencil or colored pencils.

PROCEDURE: Using the given information, chart the components of blood.

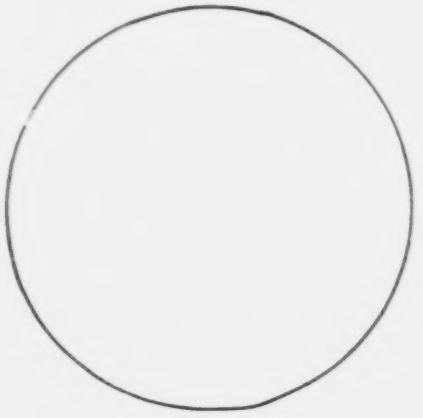



Graph the following information on the bar graph. One quart of blood contains:

2% white blood cells
43% red blood cells
55% plasma

Graph the following information on the circle graph to the right. Plasma contains:

92% water
8% digested food, salts, and wastes

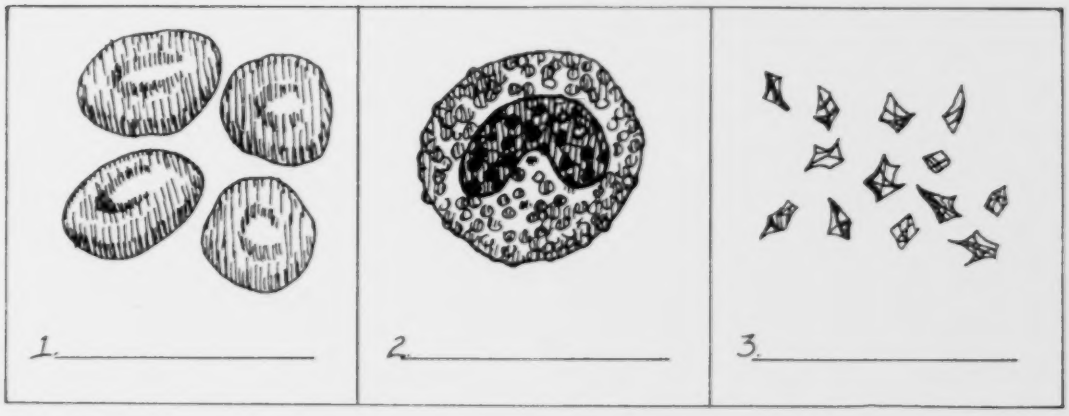


## BLOOD COMPONENTS

PURPOSE: To show the components of blood and their respective functions. This activity also illustrates the ratio of red blood cells to white, and the number of red blood cells to platelets.

MATERIALS: Drawings or ditto sheets.

PROCEDURE: Follow the given directions.



1. _____ 2. _____ 3. _____

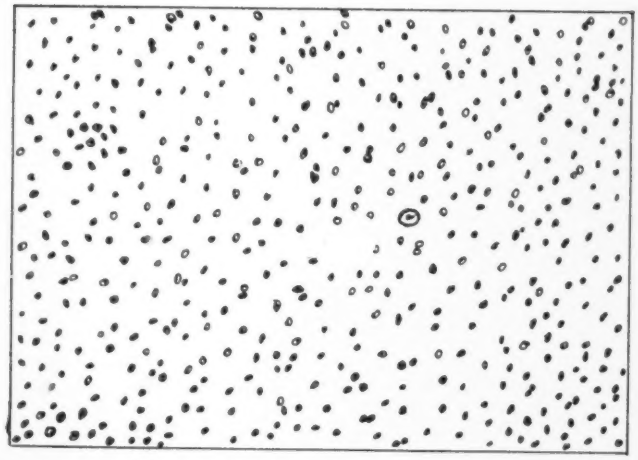
In the above drawings label the blood component. Write the function of each component below.

FUNCTION (S):

1. _____

2. _____

3. _____



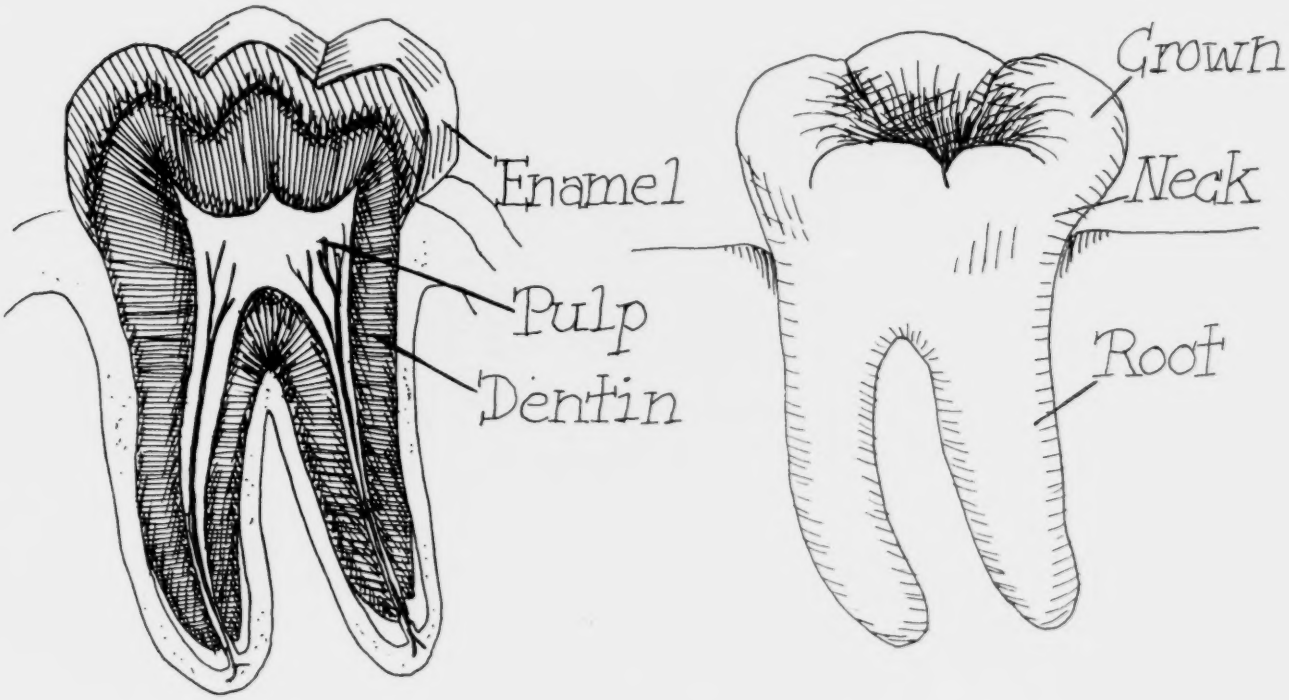
The ratio of red blood cells to white blood cells is approximately 700 to 1. In the drawing above the ratio now is about 600 to 1. Add 100 more red blood cells to make the drawing more accurate.

For every 20 red blood cells there is about one tiny red platelet. In the square above show this ratio by making a drawing.

## WHAT CAUSES TOOTH DECAY?

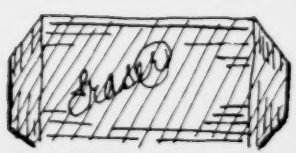
PURPOSE: To determine what some of the causes of tooth decay are.

MATERIALS: From a dentist or from students obtain teeth, various liquids, soft drinks, juices, water, etc., jars or beakers.




PROCEDURE: Into various liquids place teeth. Allow them to stay in jars for several days. Examine. Note any deposits. Fill out the chart found on the next page.

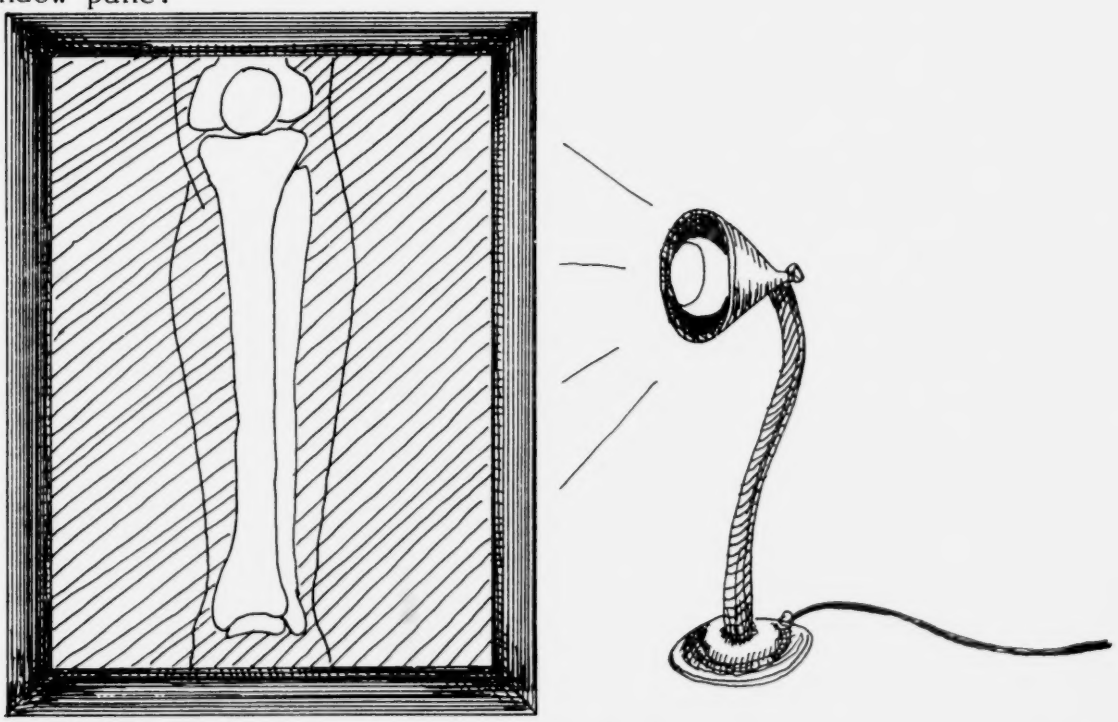
| Name of Liquid | Result after 2 weeks | Result after 4 weeks |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |



## X-RAY COLLECTION

PURPOSE: During the study of the skeleton and bones the students will be very interested in discussing fractures, various parts of the skeleton, joints, and the value of X-rays. This learning can be reinforced by looking at actual X-rays.

MATERIALS: X-rays which are no longer needed can often be obtained just for the asking from students, doctors, clinics, veterinarians, etc. In order to see the X-rays an overhead projector can be used, or an "X-ray machine" can be improvised by the use of a 75-watt light bulb under a piece of frosted glass in a picture frame. A tracing machine is best if available, or one may simply use the light at a window pane.



PROCEDURE: Look at the available X-rays, identify the bones, joints, fractures, etc.

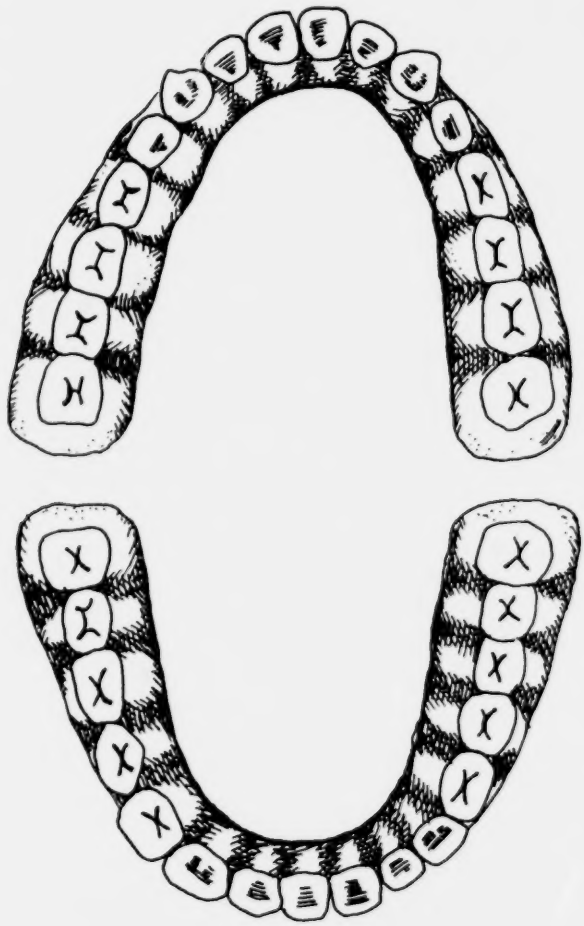
## YOUR DENTAL RECORD

PURPOSE: To make students aware of the condition of their teeth and the desirability of regular dental checkups.

MATERIALS: A prepared or student drawing of a full set of permanent teeth.

PROCEDURE: On the drawing have students record the condition of each of their teeth by checking the teeth at home in a mirror. Have the student code his teeth as follows:

P - Perfect tooth F - Filled
C - Cavity not filled E - Extracted
O - Teeth which have not erupted

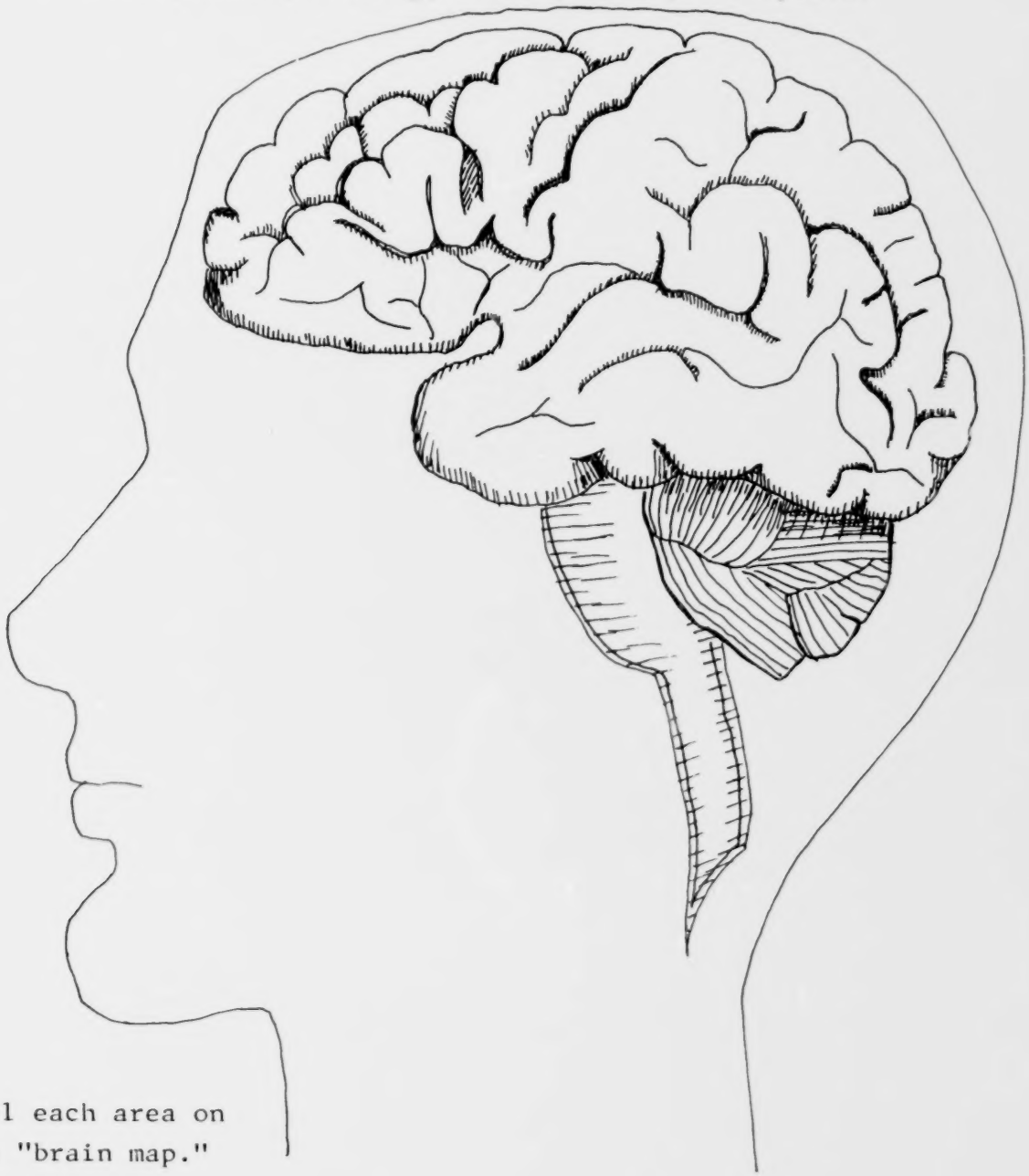


## BRAIN MAP

PURPOSE: To locate areas on the brain which control various functions.

MATERIALS: Copy of a drawing of the human brain.

PROCEDURE: Locate the various areas of the brain which control the functions of memory and learning, taste, smell, hearing, vision, touch, and speech.



Label each area on this "brain map."

## THE NERVOUS SYSTEM
### Memory

PURPOSE: To show what an important method of learning "memory" is by using that portion of the brain. To show that memorization is easier if done systematically.

MATERIALS: One 3" x 5" index card for each student in the class, a black felt tip marking pen, watch with a second hand.

PROCEDURE: On the 3" x 5" cards copy the following letters in the given order: ABABBBAABBBAAAB. Distribute the cards to the students face down. When all of the students have received their cards, ask the students to try to memorize the letters in 30 seconds.* When 30 seconds are up, have the students turn over their cards and write the letters in the given order.

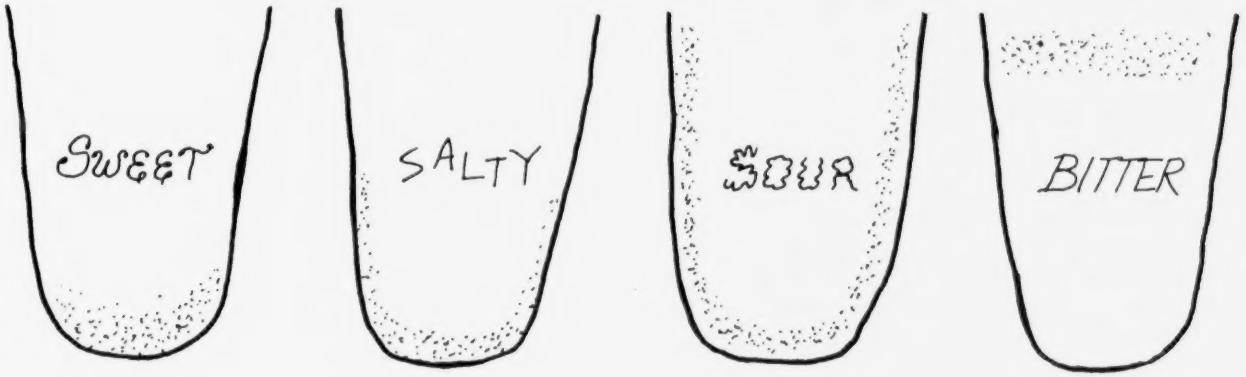
Results should indicate that those students who were able to memorize the letters did so because they arranged the letters in groups rather than trying to memorize each letter singly.

ABABBBAABBBAAAB

*Time can be extended to 45 seconds or one minute.

## HOW WELL DO YOU TASTE?
### Sensory Receptors - Taste Buds

PURPOSE: To impress upon the students that the receptor cells for taste are located in the tongue, that there are four types of receptors which distinguish sweet, sour, salt, and bitter chemical stimulation. Taste buds sensitive to sweet and salt are located



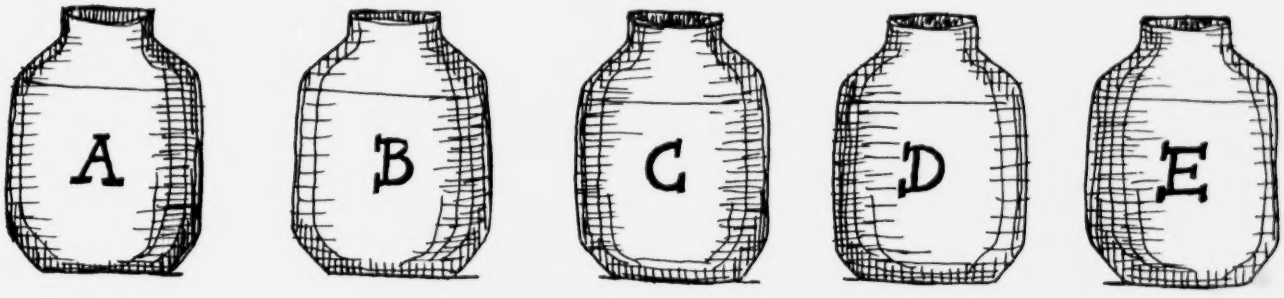

near the front tip of the tongue, sour receptors are located along the sides, and bitter receptors in the back.

MATERIALS: Five junior baby food jars, five sterile eyedroppers, small amount of sugar, measuring spoons.

PROCEDURE: Fill five clean junior baby food jars with clean water. Mark jars A, B, C, D, and E. Into jar A add one-sixteenth of a teaspoon of sugar. Into jar B add one-eighth teaspoon of sugar*, into jar C one-fourth, into jar D one-half teaspoon of sugar, and into E three-fourths. Cap the jars and shake until the sugar is dissolved. Fill a clean eyedropper with solution from jar A. Without touching the tongue, the teacher or lab partner drops a few drops of solution onto the tongue of the student being tested. The student tries to determine the unknown solution.

If he does not taste anything, he goes on to solution B, then C, etc. When the student first begins to taste something, he stops. Repeat with different students, or use as a station or lab. DO NOT TELL THE STUDENTS WHAT THE SOLUTION IS UNTIL THE LAB IS OVER.

*Salt, vinegar, or lemon juice may be used.




QUESTION: How many students were able to correctly identify the solutions from jar A? From jar B? Etc.

QUESTION: How many students did not guess the solution as sugar?

CAUTION: Do not mix droppers. Do not touch the tongue with the dropper.

The degree where a sense can barely be detected is called the threshold. Find whether A, B, C, D, or E was the most common threshold of taste for the class.

Number whose threshold was A ____.

Number whose threshold was B ____.

Number whose threshold was C ____.

Number whose threshold was D ____.

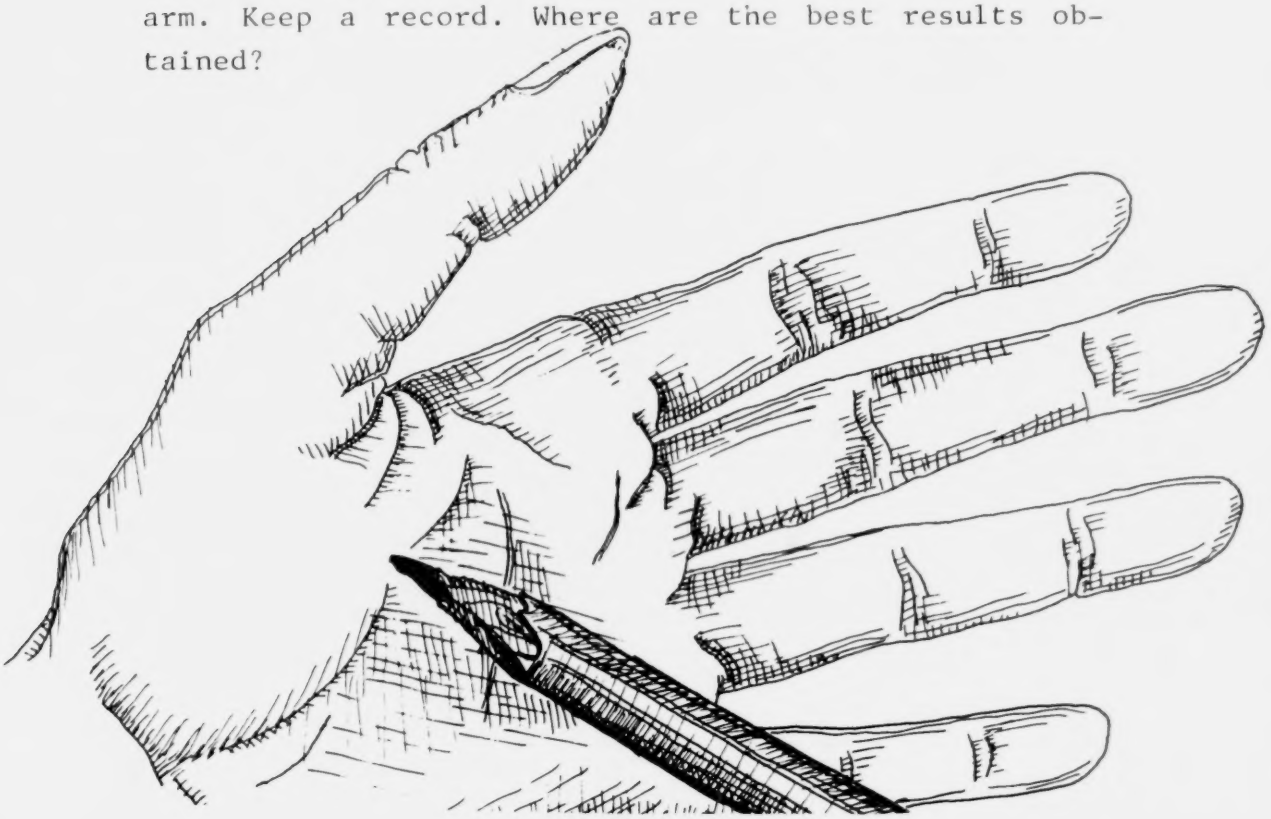
Number whose threshold was E ____.

## PRESSURE SENSORY RECEPTORS IN THE SKIN

PURPOSE: Located in the skin are sensory receptors for cold, heat, pressure, touch, and pain. In this lab we will test the sensitivity of our touch receptors.

MATERIALS: Hairpins or pencils, sharpened. Two of each for each team of students.

PROCEDURE: One team member closes his eyes. The other lightly touches the palm of his hand with two pencil points or the ends of two hairpins which have been straightened so that each hairpin has only one end touching the hand. For the first time the ends should be about one-half inch apart. Ask the partner how many ends he feels. He shouldn't have too much difficulty distinguishing two ends. Keep shortening the distance between the two ends. Soon your partner will only feel one end. Now test by sometimes using one point or sometimes using two. See how well your partner can distinguish between one and two points when they are very close. Try this test on the nose and arm. Keep a record. Where are the best results obtained?

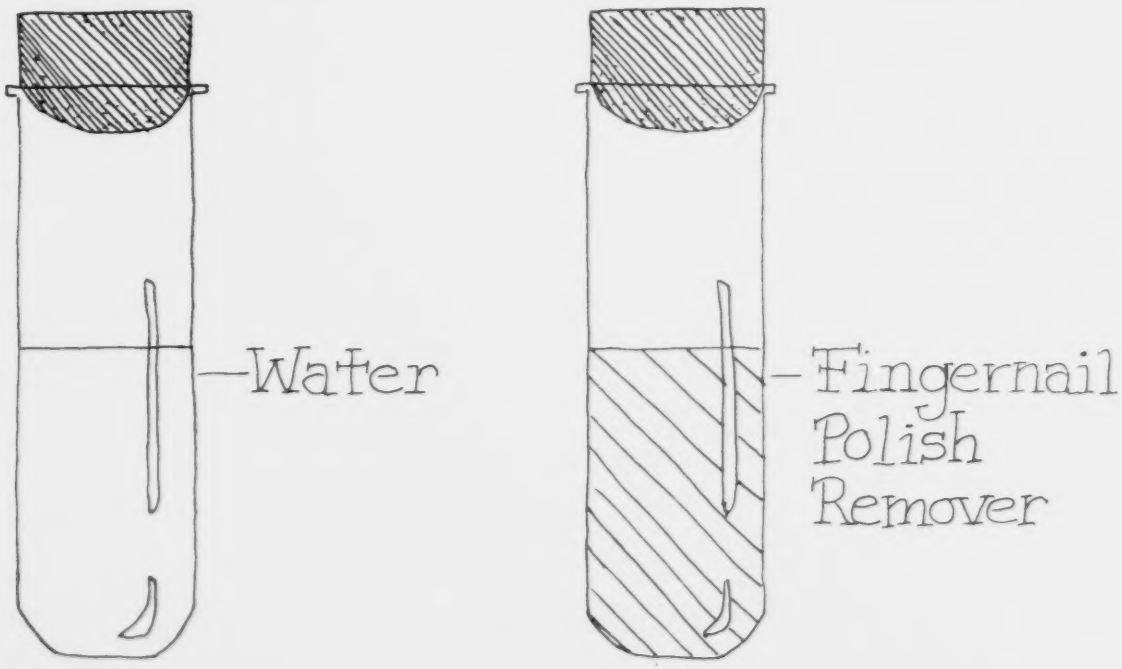


## COLD RECEPTORS IN THE SKIN

PURPOSE: To detect the sensory receptors for cold which are located in the skin.

MATERIALS: Two test tubes, corks to fit the test tubes, a test tube rack, water, and fingernail polish remover.

PROCEDURE: One team member applies water to the inside wrist of his partner using the cork of the test tube. To the other wrist he applies the polish remover. The subject tries to determine the different sensation he feels on the inside of his wrist. The fingernail polish remover evaporates rapidly, leaving a cool sensation which should be detected by the sensory receptors in the skin. The water which does not evaporate as rapidly should not feel as cool on the wrist to which it was applied.

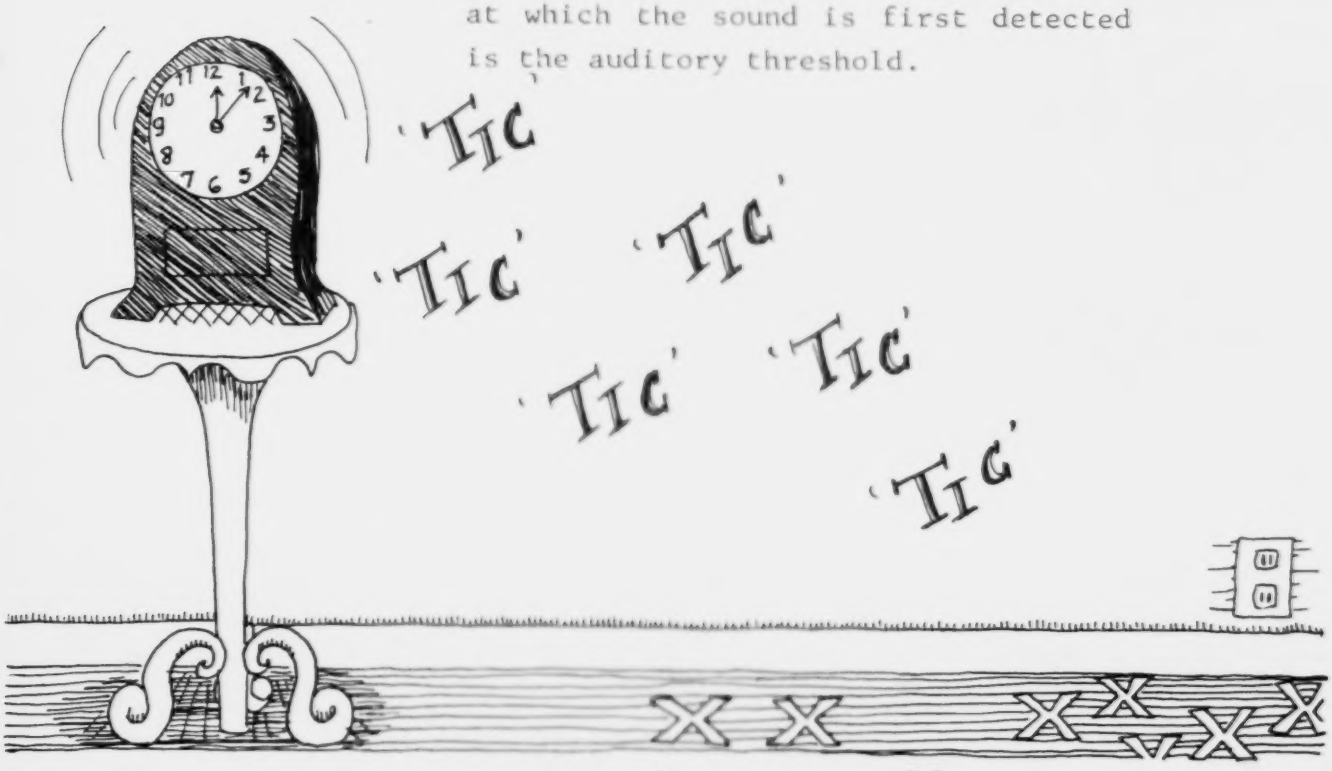


## SENSORY RECEPTORS - THE EARS

PURPOSE: This activity is designed to allow the student to determine whether his hearing is within the range of the majority of his classmates.

MATERIALS: A clock with a loud tick, chalk or tape, a quiet or empty room or large closet.

PROCEDURE: A ticking clock is placed in a box or closet in a quiet or empty room. The student walks toward the clock, listening until he first hears the ticking sound. When he does, he indicates this by placing a chalk mark on the floor. He may use his initials if he chooses. Tape, such as masking tape, can also be used, and it is in fact more durable. As the rest of the class repeats this activity, it becomes apparent that the students who hear the sound at a greater distance are endowed with the more sensitive hearing. The spot where there is a cluster of marks indicates the average hearing of the class, and the marks which are closest to the clock indicate those whose hearing is least sensitive. The level at which the sound is first detected is the auditory threshold.

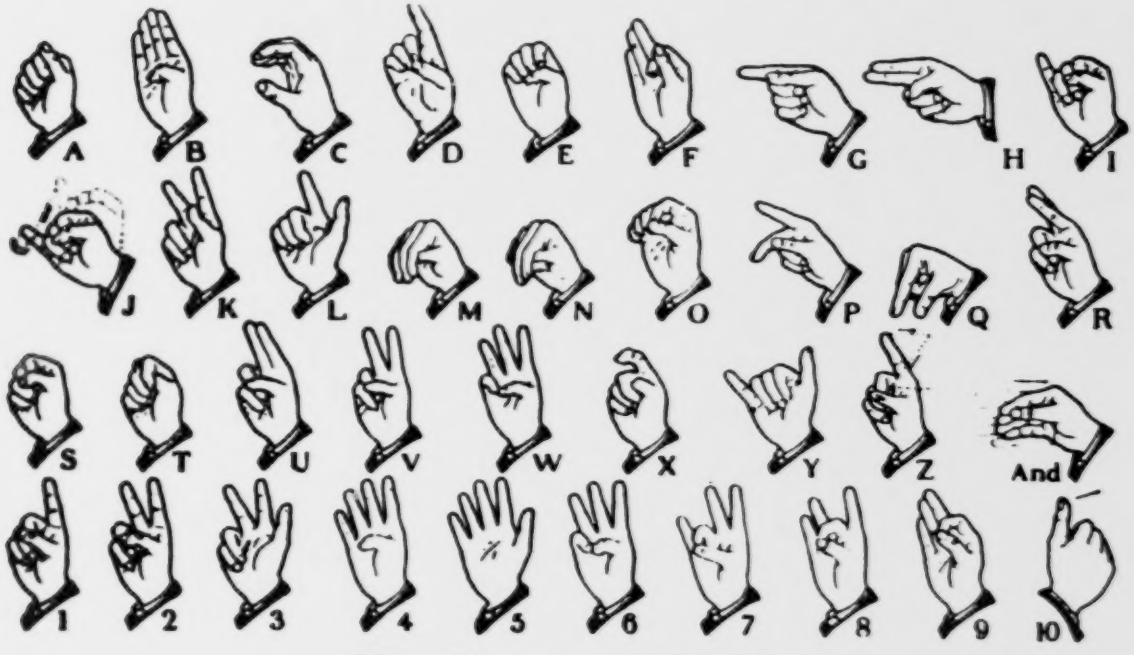


## THE MANUAL ALPHABET

PURPOSE: To add interest during the study of the senses, especially that of hearing; to become more aware of the gift of hearing; and to appreciate and care for one's sense of hearing.

MATERIALS: Copies of manual alphabet, pencil, paper.

PROCEDURE: Study the manual alphabet one line at a time. Compose sentences which stress care of the ears. Have the students decode the sentences given in the manual alphabet.




The Manual Alphabet

Sample sentences:

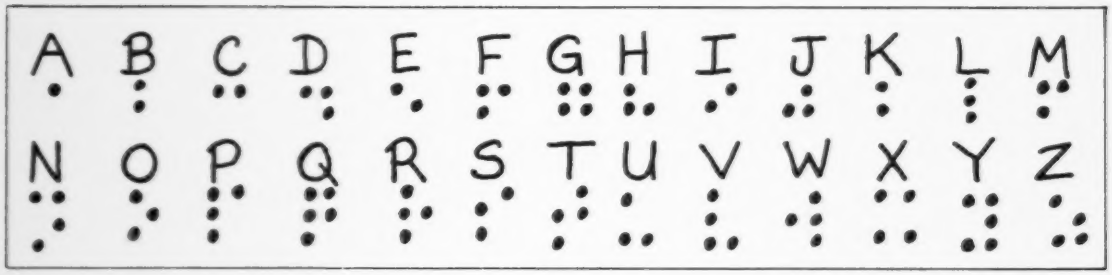
1. Earaches accompanied by fever should be checked by a doctor.
2. Loud noises can injure the ears.
3. Ears should not be cleaned with hairpins.

## THE BRAILLE ALPHABET

PURPOSE: To add interest and variety to the study of the eye. To instill appreciation for the gift of sight and to stress the importance of good eye care.

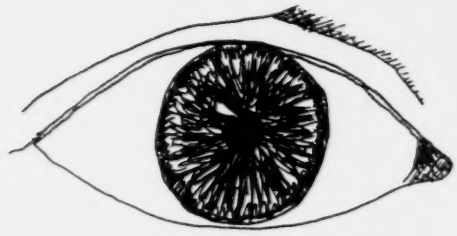
MATERIALS: Braille alphabet and message written in braille as given in the sample on the following page.

PROCEDURE: Using a copy of the braille alphabet, the teacher, with a little practice, can write a message in braille. (In reality, braille is embossed; here we are using the braille alphabet on flat paper.) A message can be written on the blackboard. To begin the study of the eyes, the message can be reproduced on paper or cards, along with a diagram of the eyes, or it may be an extra credit question on a test.

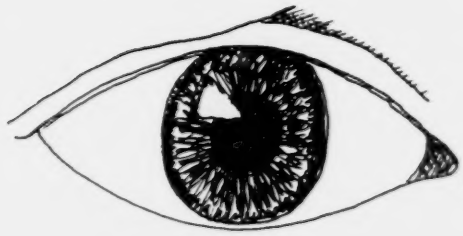


## THE EFFECT OF LIGHT ON THE PUPIL

Sensory Receptors - The Eyes



Contracted Pupil



Expanded Pupil

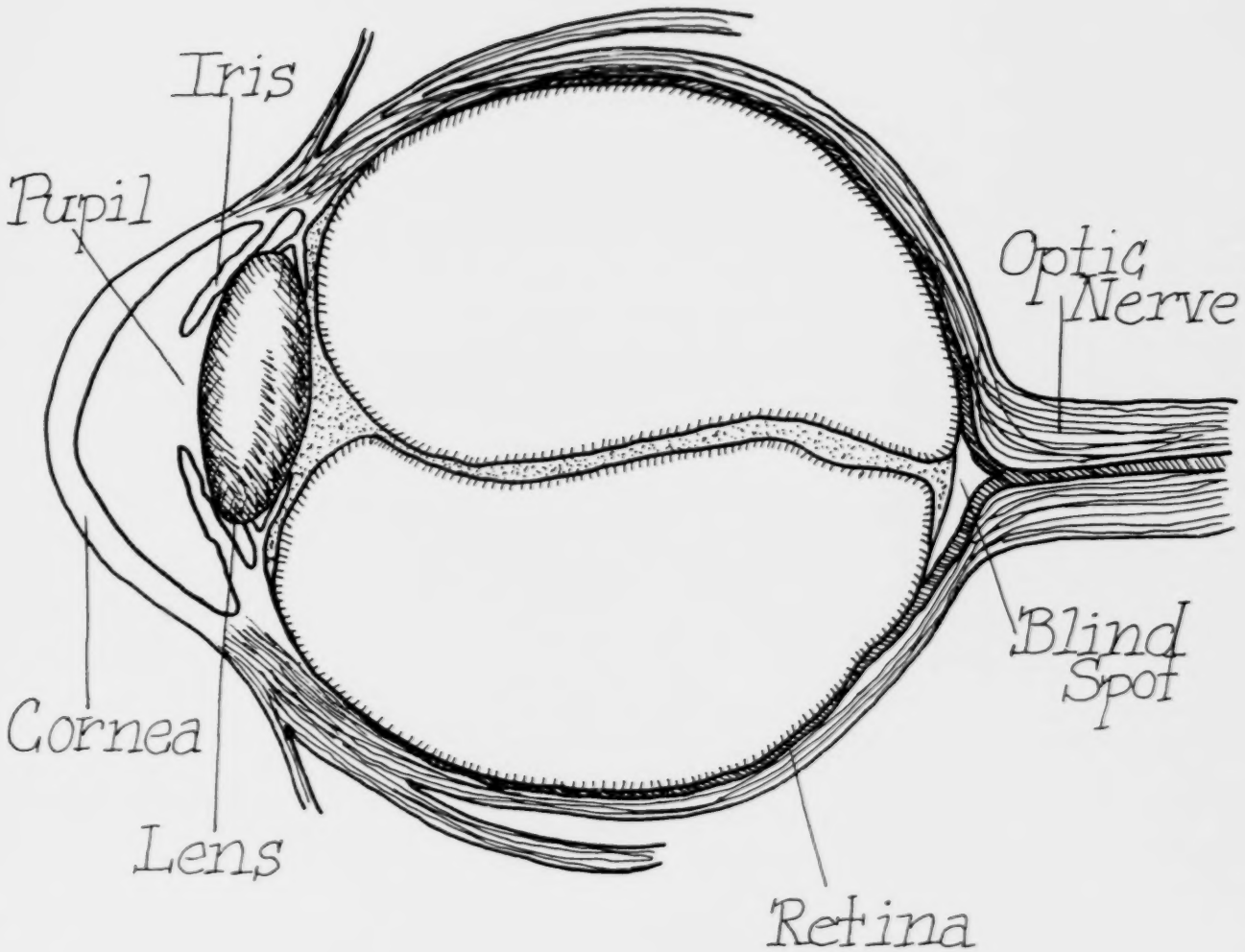
PURPOSE: To observe the change in size of the pupil - a reflex action - by the stimulus of light.

MATERIALS: Flashlights - one for each pair of students.

PROCEDURE: Have the students work in pairs. One student will shine the flashlight directly into the eyes of his partner and observe the difference in pupil size.

ALTERNATE EXERCISE: If the classroom can be darkened effectively, have the students pair up and stare into their partners' eyes. Turn off the lights for 30 seconds. Then, turn them on. Have the students give their reactions.

# The Eye




STUDENTS: As you study the sense of sight, learn the parts of the eye. This diagram is designed to help you.

## YOUR TRACKS

PURPOSE: This lab can be used during the study of the human body, heredity, animal tracks, or behavior. This lesson generates interest in oneself.

MATERIALS: Black stamp pad, white paper, fingerprint charts, magnifying glass.

PROCEDURE: Press your right thumb firmly on the stamp pad and then press it firmly on a clean sheet of white paper. Do not slide or press too hard, just firmly, roll slightly. Continue with your prints from each finger. When you have a clear pattern, fill in the chart below. Match your prints to one of the eight general types. Take prints of your friend's fingers. Examine with a magnifying glass. Are any two sets alike? Which type of print is most common?

NAME _____

ADDRESS _____

DATE _____ CLASSIFICATION _____

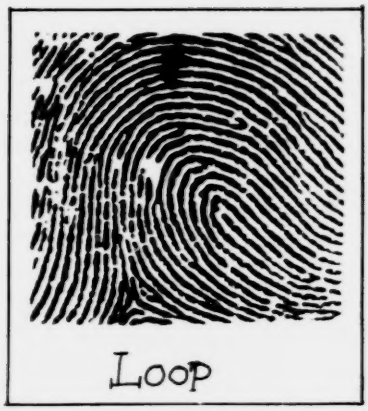
RIGHT HAND

| | | | | |
|---|---|---|---|---|
| | | | | |
| Thumb | Forefinger | Middle Finger | Ring Finger | Little Finger |

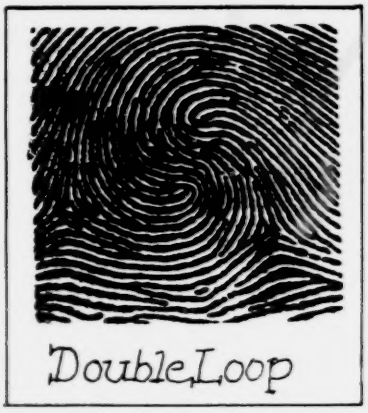
LEFT HAND

| | | | | |
|---|---|---|---|---|
| | | | | |
| Thumb | Forefinger | Middle Finger | Ring Finger | Little Finger |

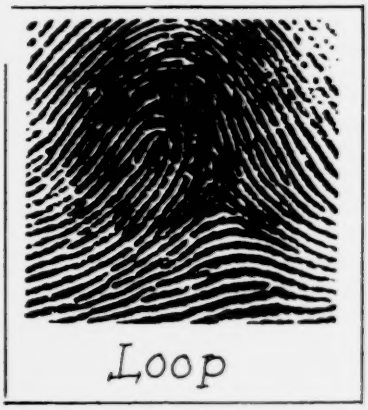
## FINGERPRINT TYPES



Loop

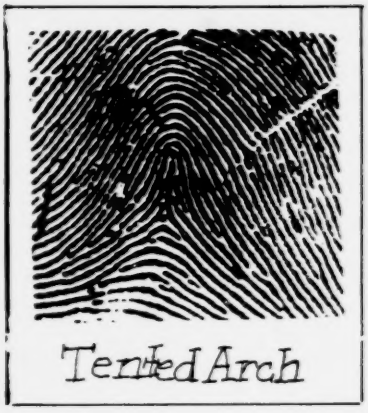


Double Loop



Loop

Central Pocket Loop



Tented Arch

Plain Arch

Plain Whorl

Accidental Whorl

On this page are illustrated the eight general types of fingerprints. Use them to identify your own prints.

## CAN YOU FIND THE BLIND SPOT?

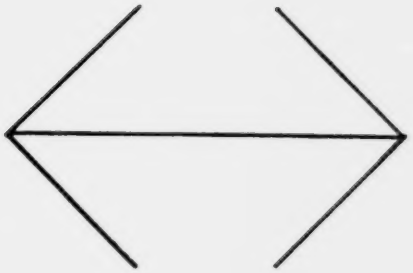
PURPOSE: While studying the structure of the eye, this easy and inexpensive activity serves to explain the position of the optic nerve and adds interest to the study of the sensory receptors.

MATERIALS: Enough 3" x 5" cards for each member of the class and a black felt tip marking pen. Make cards as shown in the sample below.

PROCEDURE: Hold the cards about a foot away from the eyes. Put the "X" on the left and cover the left eye. While looking at the "X" notice the "O." Now bring the card very slowly toward the face until the "O" disappears. When this happens, the blind spot has been found. Reverse the procedure to find the blind spot in the left eye.

EXPLANATION: The cells which enable us to see are located on the back of the inside of the eye which is called the retina. The message they receive is relayed to the brain by way of the optic nerve. At the spot where the optic nerve is attached to the eye, there are no retinal cells; therefore, this tiny place is a blind spot.

# OPTICAL ILLUSIONS



PURPOSE: To add interest to the study of the eye and the nervous system.

MATERIALS: Copies of optical illusions. Some of these can be found by checking the library and encyclopedias.

PROCEDURE: Project the optical illusions on the screen. Ask the students what they see.

## LEARNING BY TRIAL AND ERROR

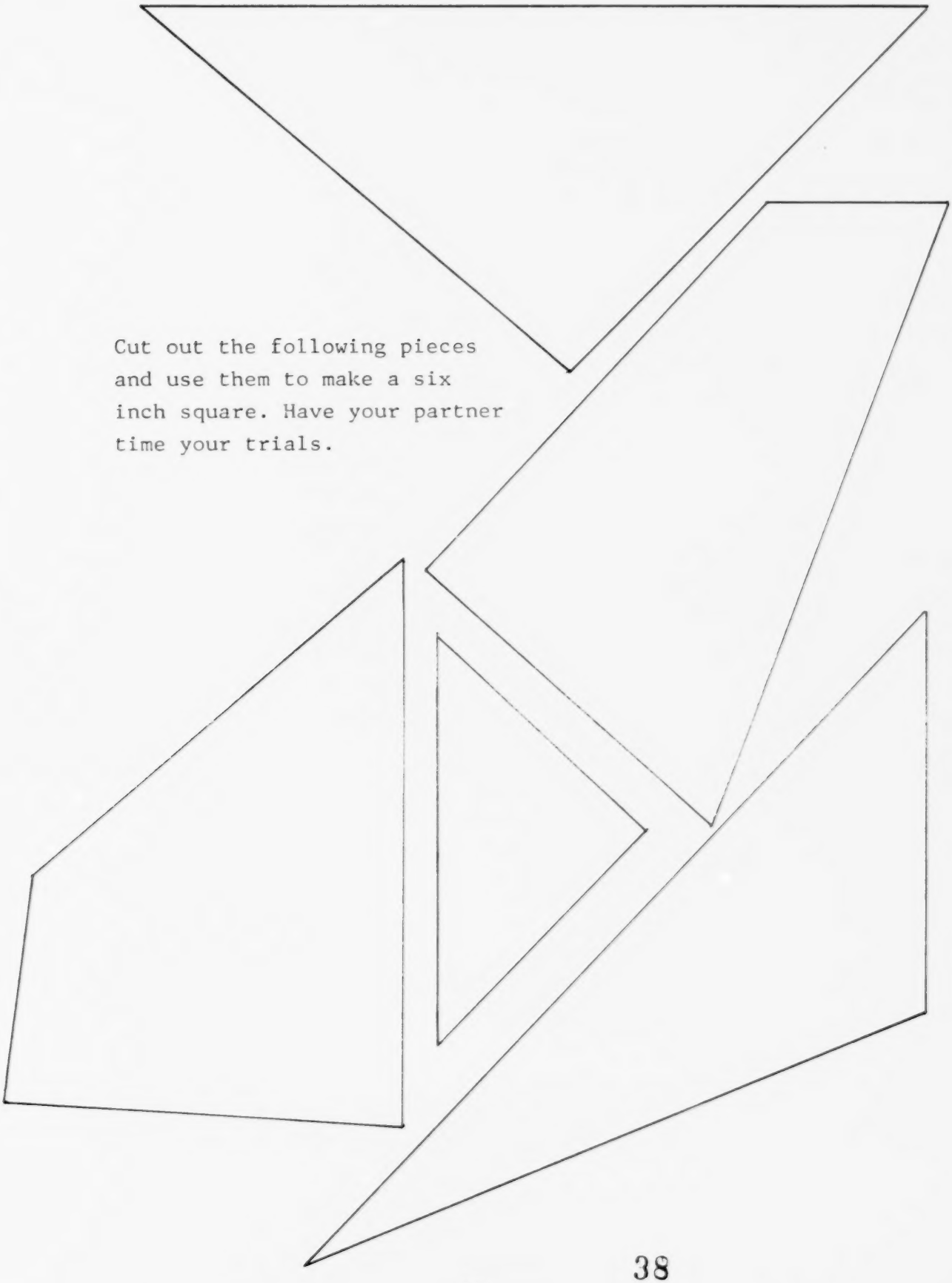
PURPOSE: This is a simple exercise to illustrate a fundamental method of learning by trial and error.

MATERIALS: From the pattern provided on the following page, cut out the puzzle on stiff paper. Transfer the pattern pieces onto ditto paper. Run off enough copies for each student. Scissors are also needed.

PROCEDURE: Have each student cut out the pieces of his puzzle. When the class is ready, all students will begin putting the pieces together. Either the teacher or an appointed student will keep track of the time. When the student completes his puzzle, he makes note of the time it took to do so, then he scrambles the puzzle and puts it together again. He repeats this several times and each time the procedure should become easier. He is learning from his errors. The puzzle can be found on the next page. A sample scorecard is illustrated below.

| Trials | Time |
|---|---|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |

Cut out the following pieces and use them to make a six inch square. Have your partner time your trials.



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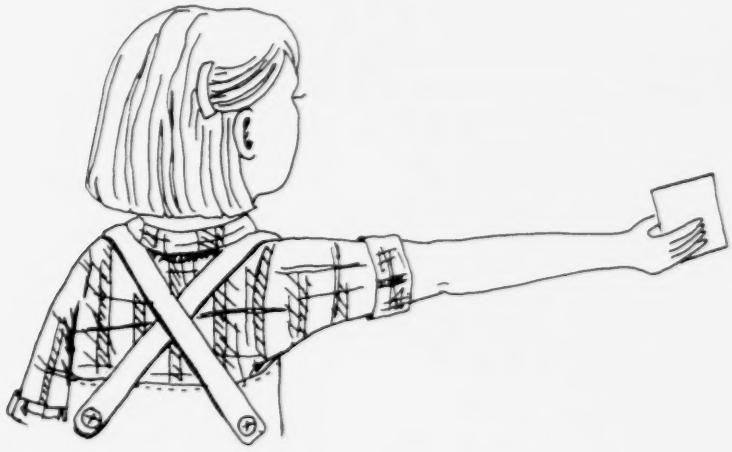
## DETECTION OF COLOR

PURPOSE: In the retina of the eye there are two types of receptors sensitive to light: the rod cells which are sensitive to black and white, and the cone cells which detect color. The purpose of this lab is to emphasize that fact.

MATERIALS: Envelope with strips of colored construction paper (red, green, yellow, purple, orange, etc.). One set for each student or pair of students.

PROCEDURE: Without looking at the paper in the envelope, reach in and pull out one strip. DO NOT LOOK AT THE PAPER. Hold the strip of paper at arm's length, level to the eyes, at the side of the head. Looking straight ahead, slowly move the strip of paper to a spot at eye level where it can barely be seen. Stop. Can you distinguish its color? Try another strip. Remember to hold the paper to the side of the head where it cannot be seen and then to bring it around to a spot where it can just barely be detected and then stop. Repeat.

From this experiment can you tell where (center or edge of the retina) most of the cone cells are located?



## HOW WELL DO YOU SEE?

PURPOSE: Almost all students are interested in themselves and enjoy activities which involve testing themselves. The following activity will give the student an approximate idea of whether or not his sight is within normal range. (This is not to be a substitute for a regular eye exam.)

MATERIALS: An eye chart or copy which is clear and distinct.

PROCEDURE: Attach eye chart to wall and ask student to read or test himself. Chart should be placed 20 feet away. Cover right eye to test left, and vice versa. A student who is able to read line 8 at 20 feet has normal vision, or 20-20 vision. If the student can only read to line 6, his vision is said to be 20-30, or he is reading at 20 feet the line which normal vision could read at 30 feet.

A portion of the eye chart can be found on the following page.

NOTE: This activity makes a good exercise for a station if you are using the learning station approach.

After you have read the eye chart at twenty feet, check your score on the vision score card.

VISION SCORE CARD

_____ Vision $\frac{20}{50}$

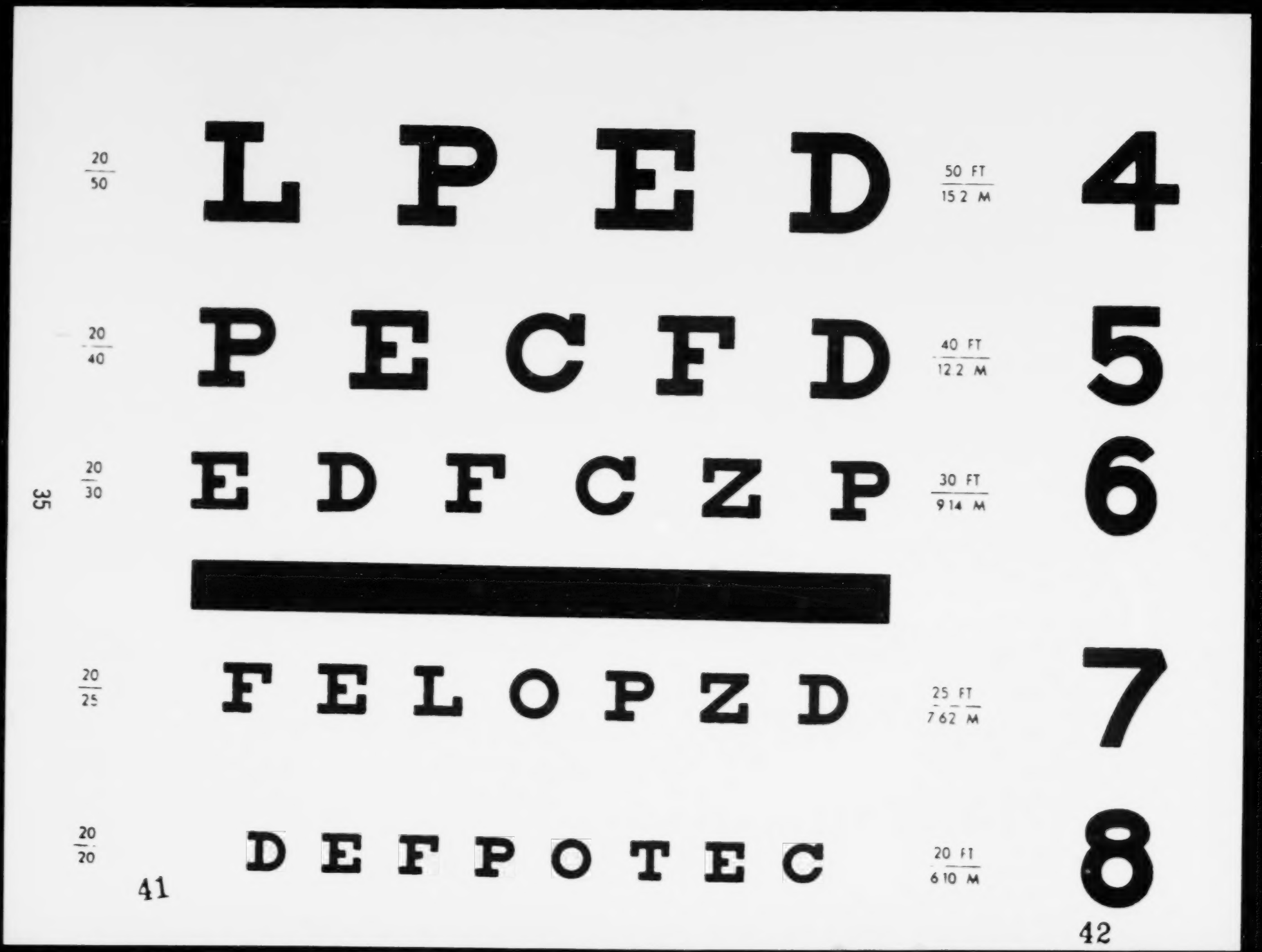
_____ Vision $\frac{20}{40}$

_____ Vision $\frac{20}{30}$

_____ Vision $\frac{20}{25}$

_____ Vision $\frac{20}{25}$

_____ Could not read the eye chart. Needs a checkup.


20/50
L P E D
50 FT 15 2 M
4
20/40
P E C F D
40 FT 12 2 M
5
20/30
E D F C Z P
30 FT 9 14 M
6
20/25
F E L O P Z D
25 FT 7 62 M
7
20/20
D E F P O T E C
20 FT 6 10 M
8
35
41
42

## NEGATIVE AFTERIMAGES

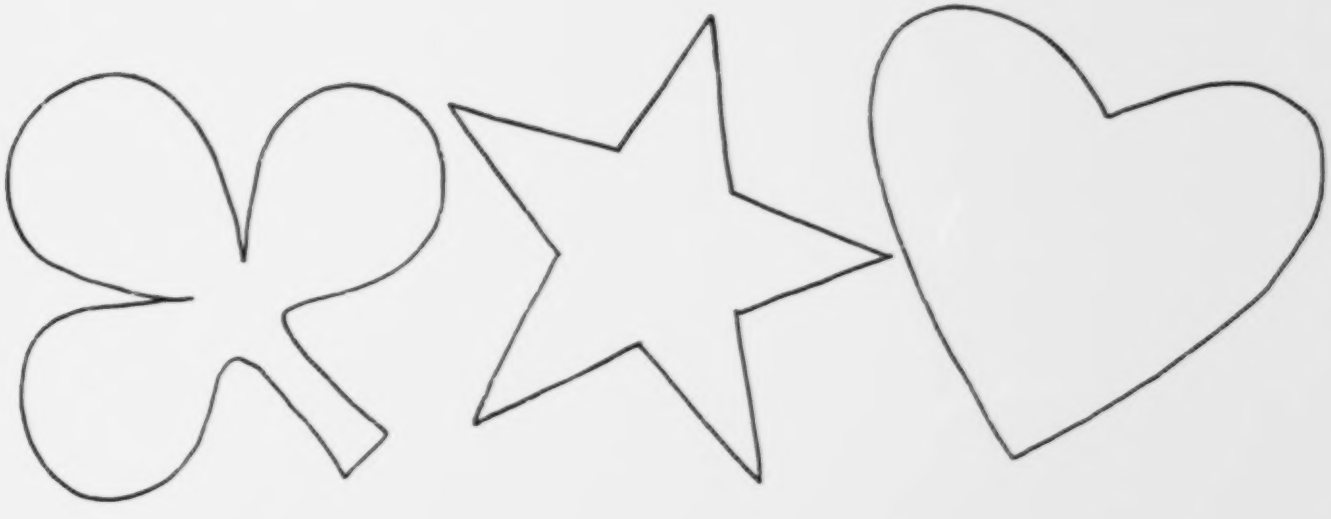
PURPOSE: To aid in the understanding of the functions of color receptor cells in the human eye.

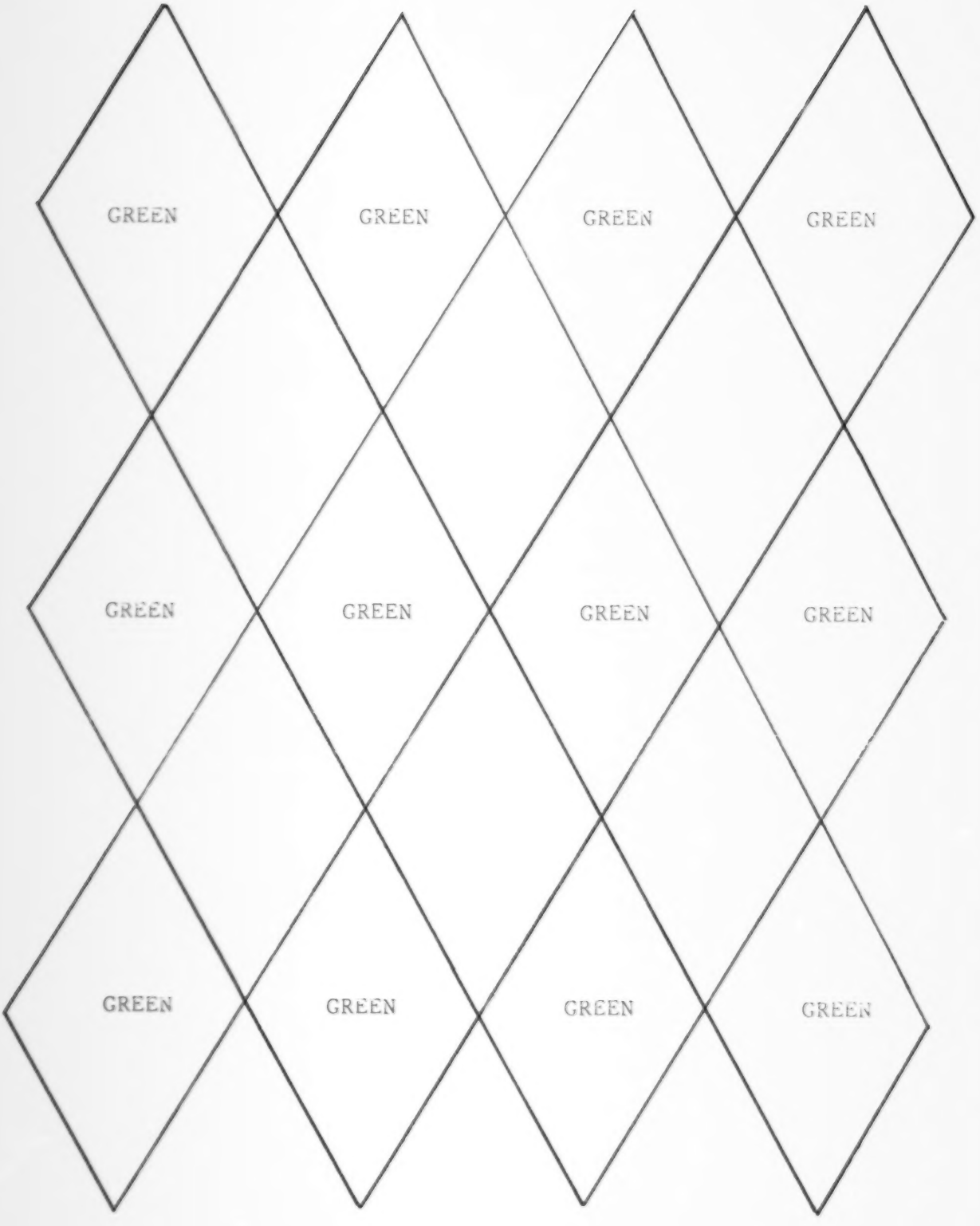
MATERIALS: Colored construction paper, white construction paper, scissors, and glue.

PROCEDURE: Cut out red, green, yellow, etc., construction paper shapes such as hearts, diamonds, stars, clovers, and circles. Paste in rows on white construction paper to make materials for the activity below. Put a black dot on the center of the sheet.

ACTIVITY: Stare at the black dot for 30 to 40 seconds, then look immediately on a sheet of white paper. A negative afterimage may occur. Prolonged staring causes the reduction in the sensitivity of the corresponding receptors in the eye, resulting in the appearance of the complementary colors when looking at the blank sheet of paper.

*A sample follows on the next page.

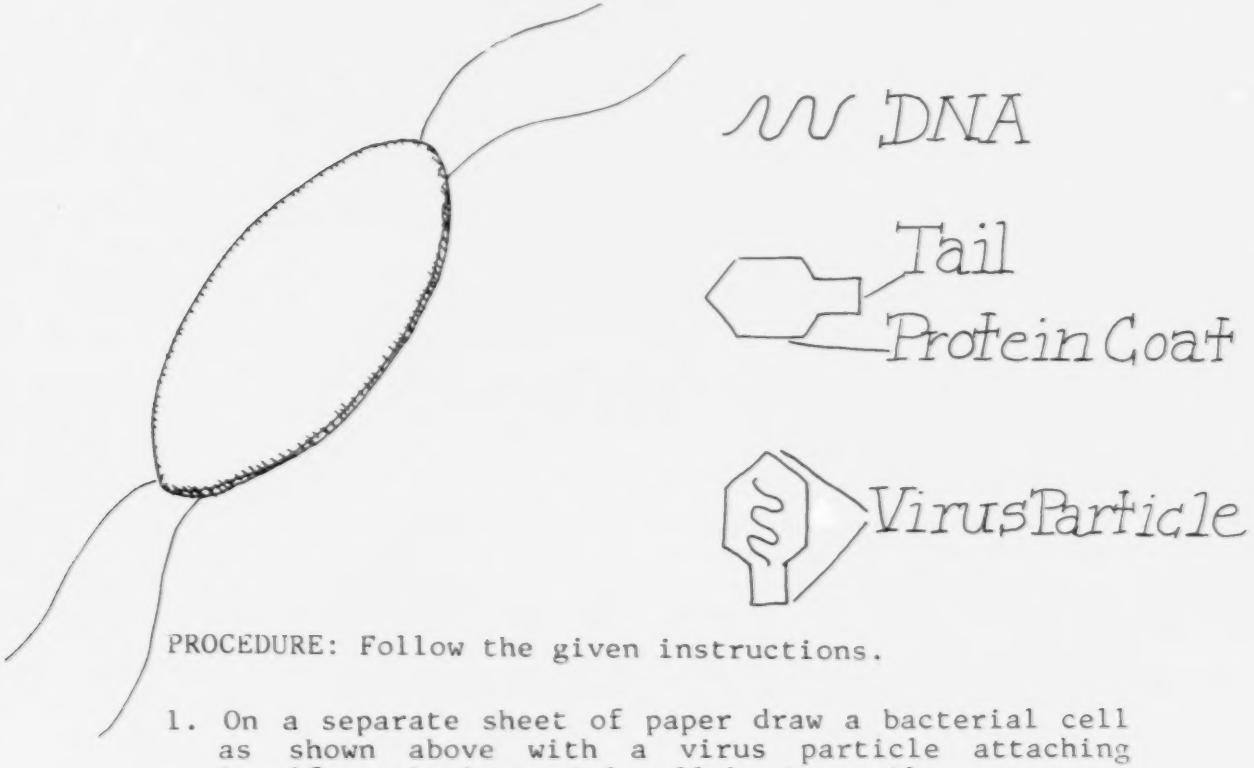



GREEN
GREEN
GREEN
GREEN
GREEN
GREEN
GREEN
GREEN
GREEN
GREEN
GREEN
GREEN

## VIRUS INVASION OF A BACTERIAL CELL

PURPOSE: This activity demonstrates how viruses multiply within a bacterial cell. It also demonstrates how well a student can read and carry out the given instructions.

MATERIALS: Activity sheet, pen or pencil, paper.




PROCEDURE: Follow the given instructions.

1. On a separate sheet of paper draw a bacterial cell as shown above with a virus particle attaching itself to the bacterial cell by its tail.

2. Draw the bacterial cell with the protein coat attached, but the DNA is now invading the bacterial cell through the tail.

3. Draw the bacterial cell with many protein coats and DNA particles inside the cell. (DNA particles are outside the protein coats.)

4. Now draw the bacterial cell containing the many protein coats with the virus particles inside the protein coats.

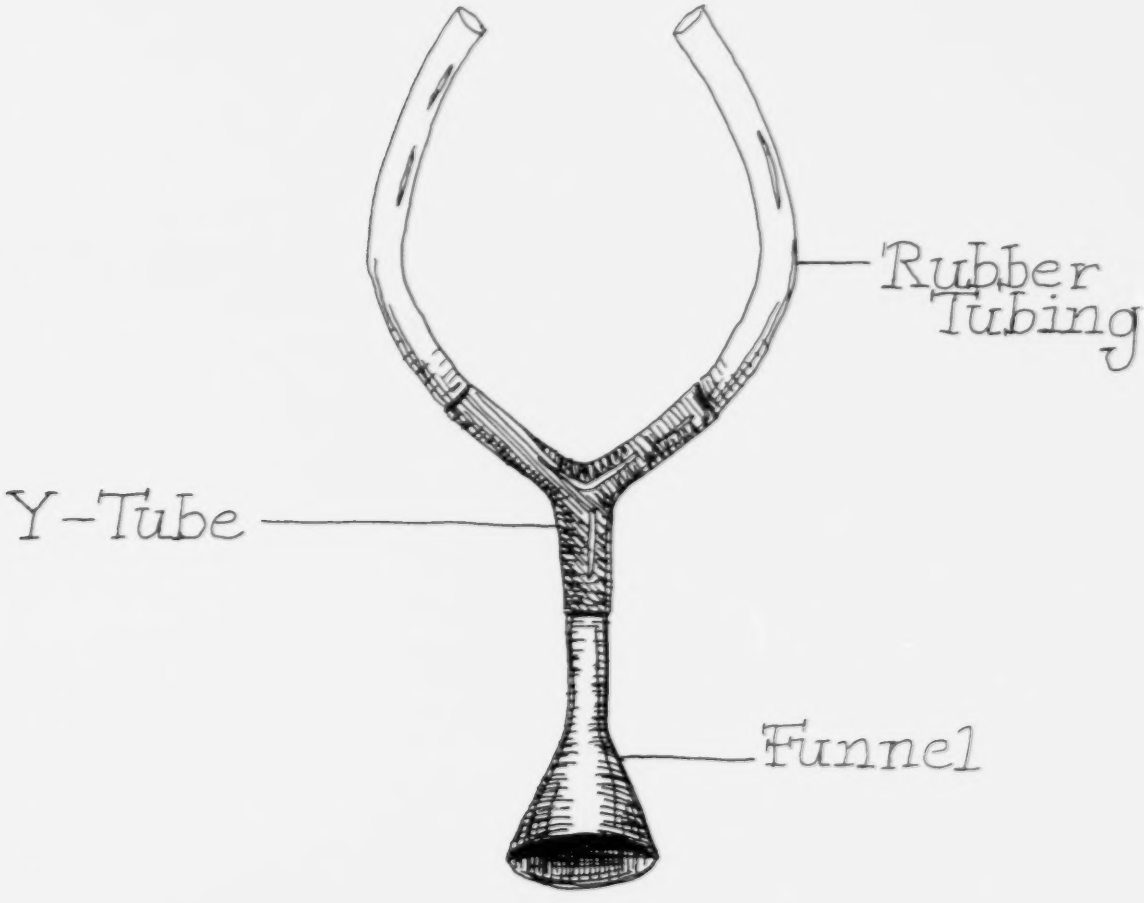
5. Lastly, draw the bacterial cell bursting and releasing many virus particles.

## LISTEN TO YOUR HEART

PURPOSE: During the study of the heart and circulatory system students will benefit by listening to their own heartbeat.

MATERIALS: A stethoscope, either genuine or class made. Materials for making stethoscope: Y-tube, rubber tubing, small funnel.

PROCEDURE: Have the students listen to their heart sounds. If a stethoscope is not available, one can be made as shown below.



## MAGNIFICENT JOURNEY

PURPOSE: To trace the blood through the human body in order to better understand how the heart and circulatory system operates.

MATERIALS: The given information.

PROCEDURE: Pretend you are a red blood cell. Trace your path as you leave the big toe and go back to the right side of the heart to be recycled through tne lungs, then through the left side of the heart and into the aorta.

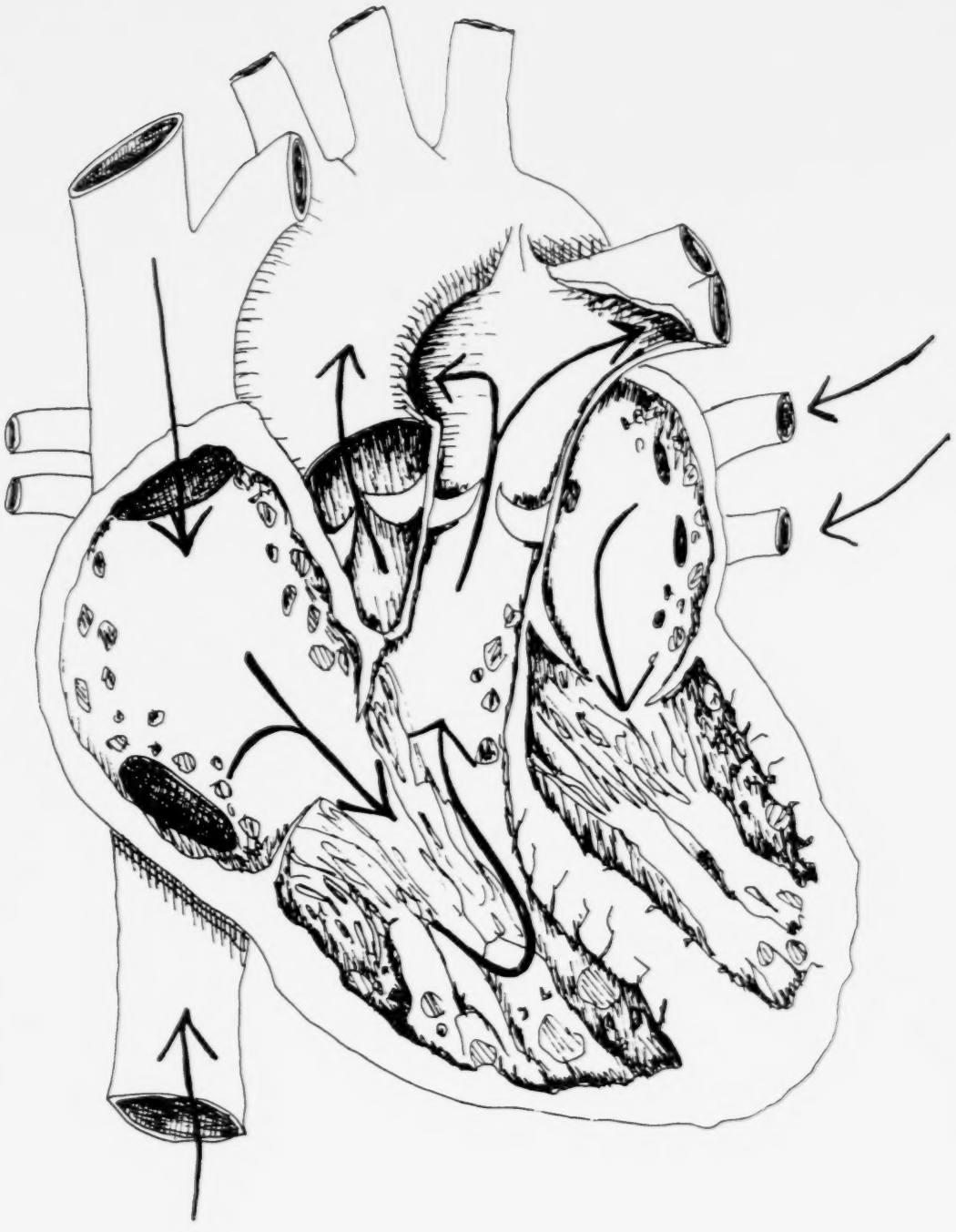
Write the letter answers in order, starting with the big toe.

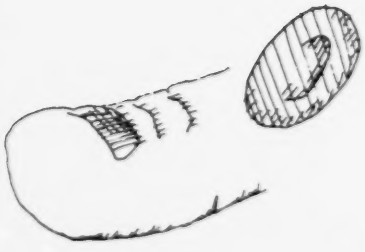
a. tricuspid valve
b. right atrium
c. capillaries in big toe
d. small vein
e. aorta
f. inferior vena cava
g. larger vein
h. pulmonary valve
i. pulmonary vein
j. right ventricle
k. pulmonary artery
l. left atrium
m. aortic valve
n. lungs
o. bicuspid valve
p. left ventricle

ANSWER:

C _____ _____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____ _____ E





# Blood Pathways

## SUGAR, STARCH OR PROTEIN?

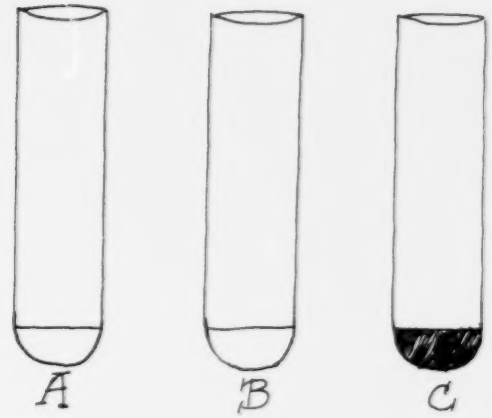
This is a simple qualitative experiment to find whether a food is basically a sugar, a starch, or a protein. It can be done during the study of foods as a qualitative analysis experiment, or at any appropriate time during the study of digestion, enzymes, etc.

MATERIALS: Biuret solution, Fehlings's A and B solutions, and iodine. Also needed are samples of foods which are in white or whitish powder form such as cornstarch, dextrose powder, and gelatin. Other food samples may be tested such as mixes, powdered sugar, powdered frosting, and dehydrated potatoes. Envelopes are also needed.

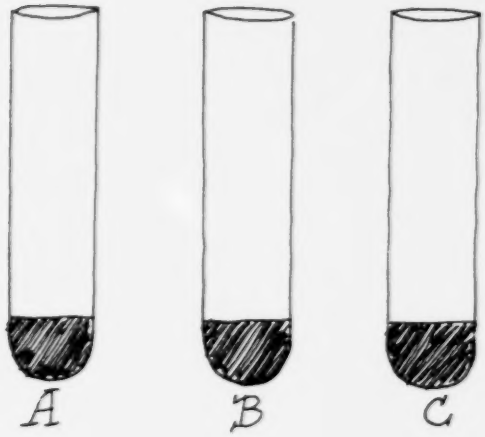
PROCEDURE: Into at least three envelopes put a sample of a food to be tested for protein, starch, or sugar qualities. Label the envelopes A, B, and C. The students are to determine which envelope contains the starch by using a small amount of the unknown and adding a drop or two of iodine. Next, add a small amount of the unknown into a test tube to which Biuret reagent has been added. To test for sugar add 10 cc of each Fehling's A and B to a test tube with a small amount of the unknown present and heat contents carefully, being sure to keep test tube pointed away from the face.

NOTE TO THE TEACHER:

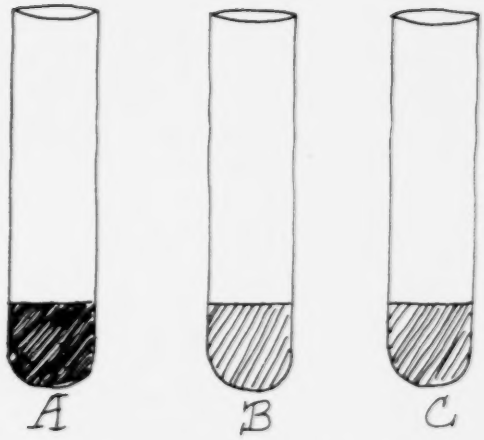
Iodine turns purple-black if starch is present. Fehling's solution turns brick red in presence of sugar. Biuret reagent turns from blue to purple in the presence of protein.




Unknown + Iodine → purple - black (starch is present)




Unknown + Biuret reagent → turns from blue to purple (protein is present)



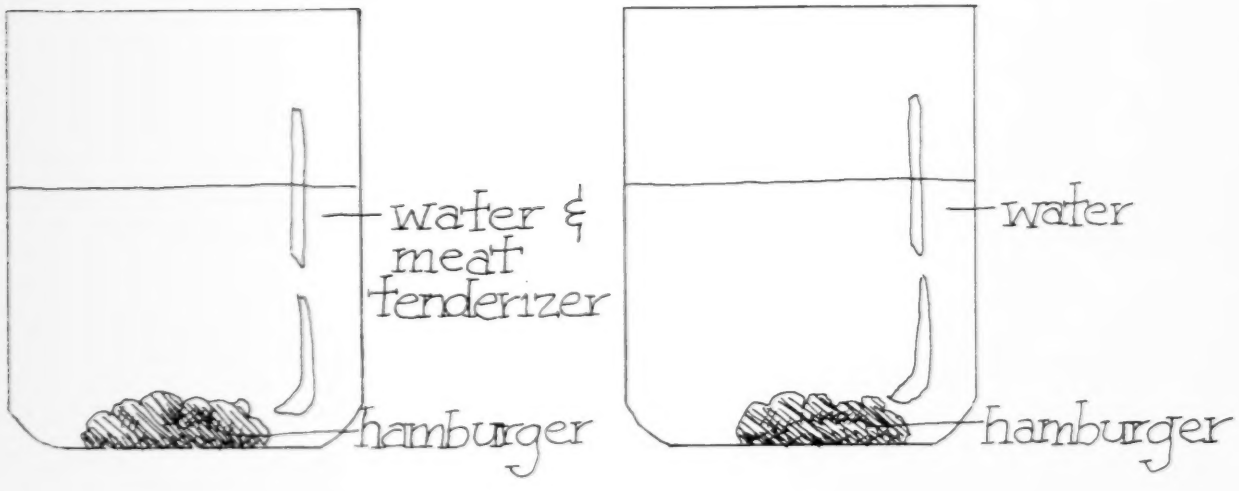

Unknown + Fehling's A & B + heat → turns brick red (sugar is present)

## THE EFFECTS OF ENZYMES ON MEAT

PURPOSE: To show how digestive juices act upon meat.

MATERIALS: Meat tenderizer, hamburger, or thin strips of meat.

PROCEDURE: In a beaker or jar dissolve one teaspoon of meat tenderizer in 100 cc of water. Add one teaspoon of hamburger or suspend a thin strip of meat into the meat tenderizer and water solution. Into a second beaker place hamburger or a strip of meat into 100 cc of plain water. Check the results the following day. Compare and explain.

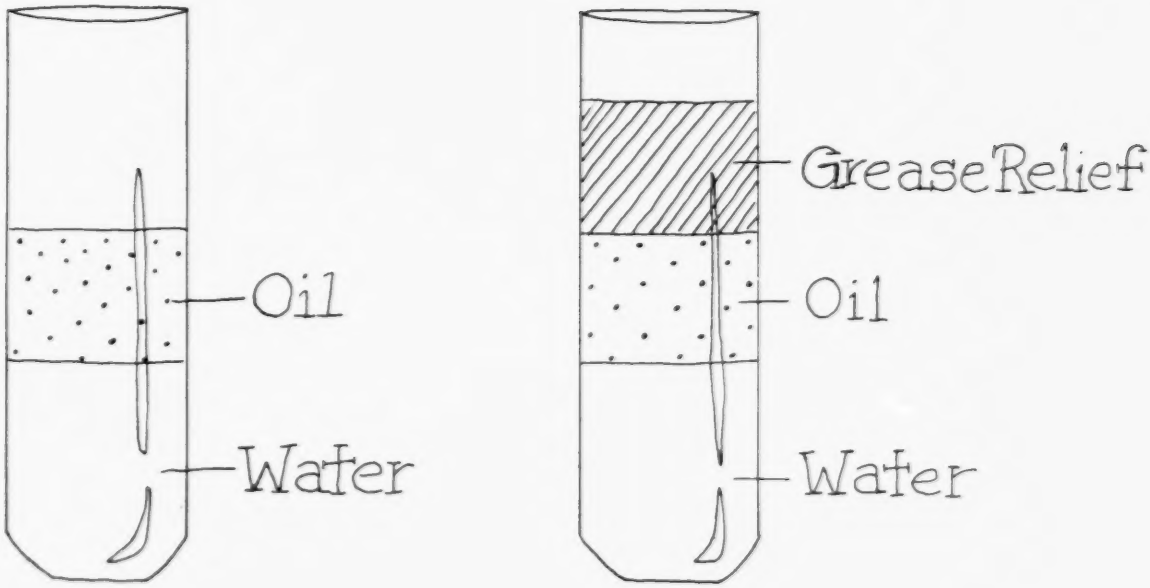


## THE ACTION OF BILE

PURPOSE: To show very simply the action of an emulsifier on fats.

MATERIALS: Cooking oil, Grease Relief, water, and two test tubes.

PROCEDURE: Into a test tube put some water and oil. Shake. Into a second test tube pour water, oil, and Grease Relief. Shake. Note the results.



## LEADING CAUSES OF DEATH

PURPOSE: To acquaint students with information which dramatically illustrated the leading causes of death in their state. This exercise also gives practice in the making and reading of graphs.

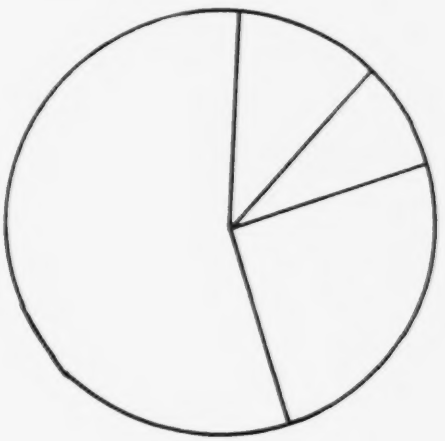
MATERIALS: Information concerning the leading causes of death in your state. This information can be obtained from the local health department, local Heart Association, Cancer Association, etc. Also needed are graph paper, pencil or pen.

PROCEDURE: After obtaining the information on the leading causes of death in your state, have students make a pie and/or bar graph to illustrate the information.

EXAMPLE:

LEADING CAUSES OF DEATH IN GEORGIA

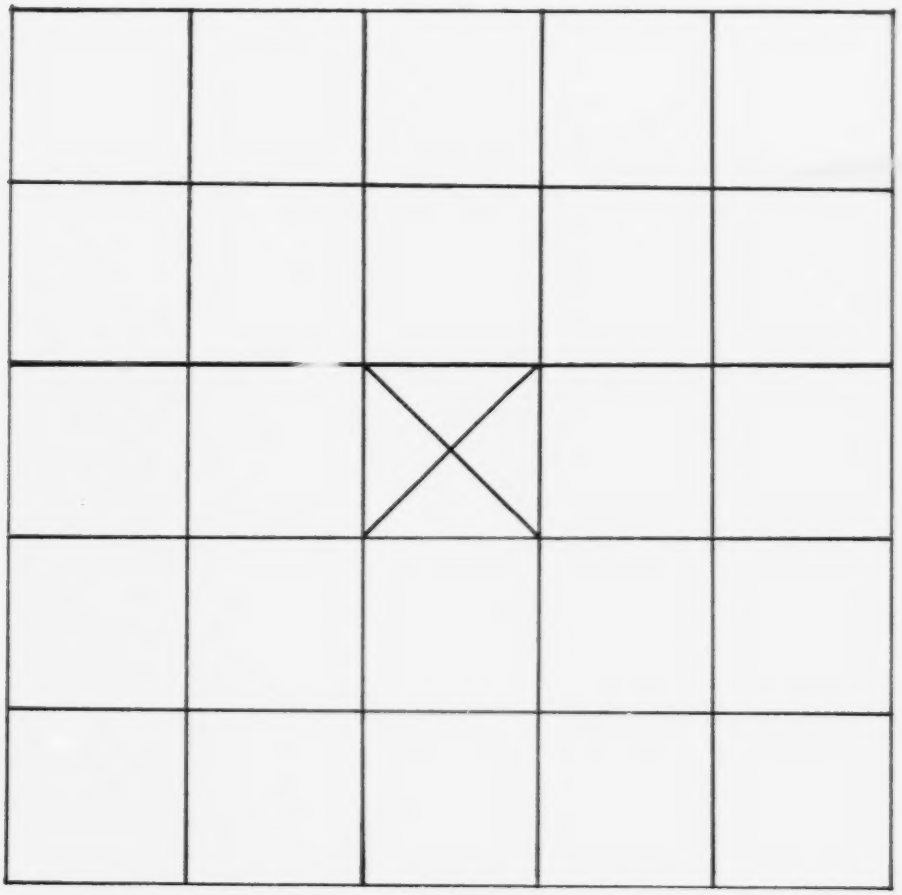
Cardiovascular Disease.....51%
Cancer.....17%
Accidents..... 7%
All Other Causes.....25%



## BODY BINGO

From the list below fill in your card with body parts. When your teacher calls out a part which you had selected, cross out that part. Five parts crossed out in a row is BODY BINGO.

blood, liver, cornea, pinna, molar, large intestine, pituitary, lens, rib, atrium, radius, adenoid, maleus, femur, lung, trachea, cerebellum, aorta, kidney, nose, pharnyx, capillary, ureter, septum, stomach, spleen, incisor, mandible, canine, epiglottis, tongue, ulna, sternum, tonsil, tibia, pancreas, larynx, thyroid, iris, cerebrum, plasma, gallbladder, diaphragm, medulla, thymus, pupil, epidermis, bronchus.

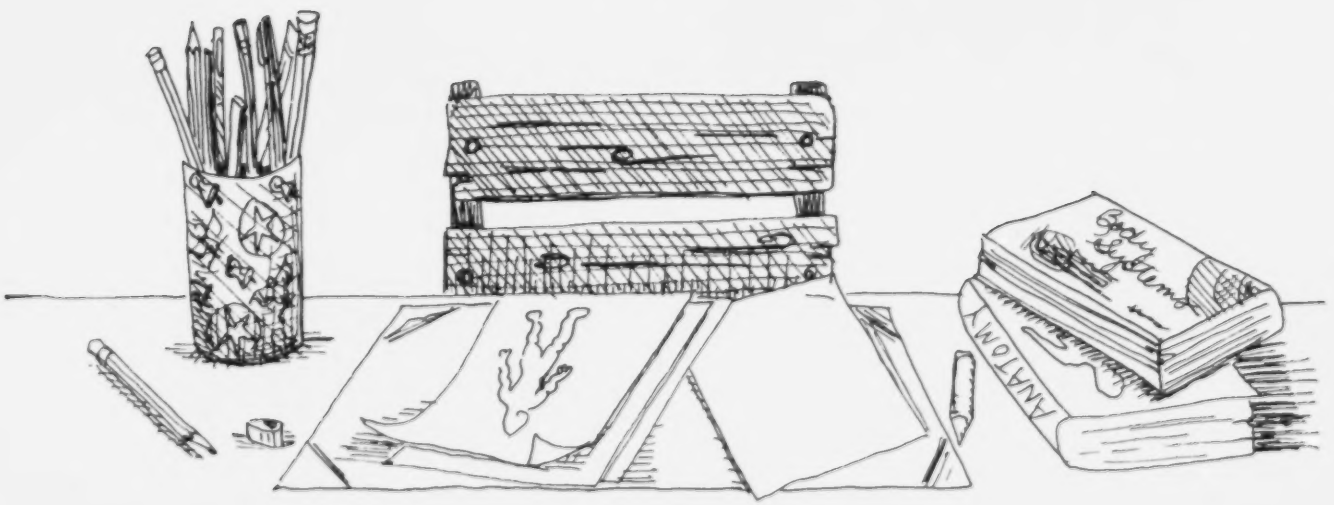


## THE "ANITOMIC" MAN

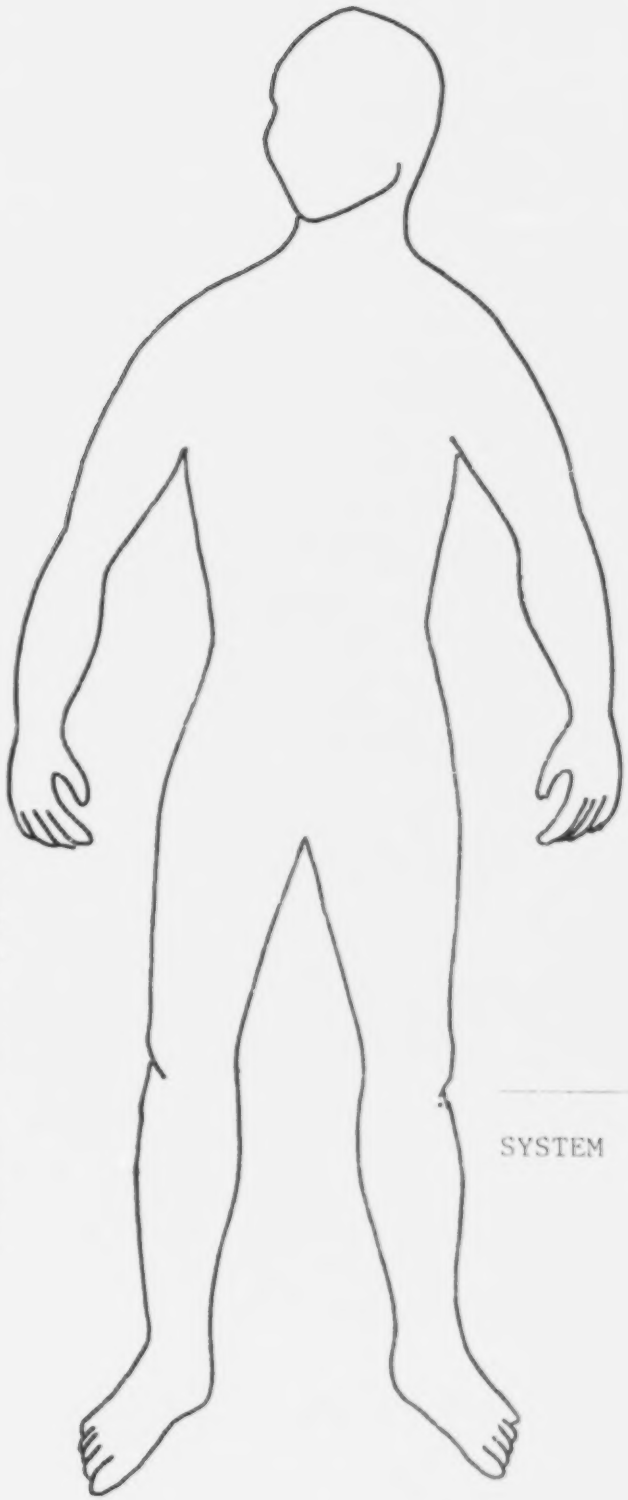
PURPOSE: To reinforce the location of the systems of the human body and to identify the parts of the various systems of the body.

MATERIALS: A mimeograph or ditto outline of the human form, colored pencils, textbook diagrams or charts of the body's various systems.

PROCEDURE: Have the students fill in the outline with a body system such as the circulatory, urinary or nervous system. The teacher may wish the students to do one outline for each system studied. Various parts may be color coded and labeled. This is a simple exercise but one which most students enjoy. Sample outline is on the next page.



NOTE TO THE TEACHER: Each student will need several copies of this page, one for each system of the body you wish to introduce. Before duplicating simply cover these directions with a piece of white paper.



_____ SYSTEM

Use this outline of the "anitomic" man for filling in the various body systems. Label each system.

## DIGESTIVE SYSTEM

PURPOSE: This exercise can be used as an aid to the learning of the digestive system, as a quiz, or as a review.

MATERIALS: Drawing of the digestive system. You will find one on the next page.

PROCEDURE: Match the digestive parts on the drawing to the terms below; use the same terms to identify the descriptions of digestive parts on the bottom of this page.

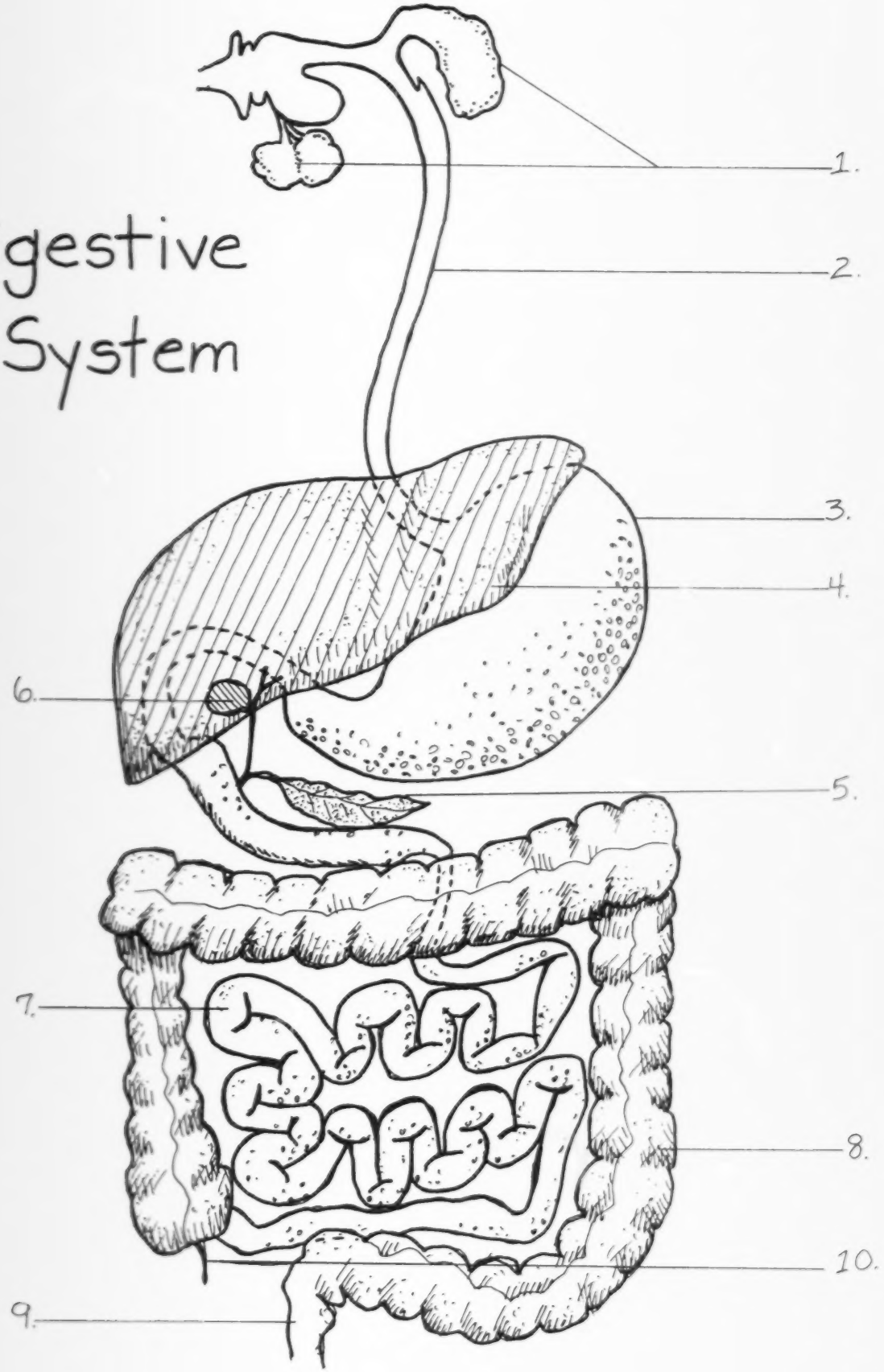
TERMS

| | |
|---|---|
| Salivary glands | Large intestine |
| Stomach | Pancreas |
| Appendix | Esophagus |
| Gall bladder | Rectum |
| Small intestine | Liver |

DESCRIPTIONS

1. _____ is the longest and narrowest part of the intestine.
2. _____ are glands which secrete saliva.
3. _____ is the tube from the throat to stomach.
4. _____ gland containing 3 layers of smooth muscle for churning food.
5. _____ is a finger like outgrowth of the intestine which can become inflamed.
6. _____ is the lower end of the large intestine.
7. _____ is the shorter but wider section of the intestine.
8. _____ is a large gland which secretes bile.
9. _____ is a small gland which stores bile.
10. _____ is a gland which secretes pancreatic juices for digestion as well as the hormone insulin.

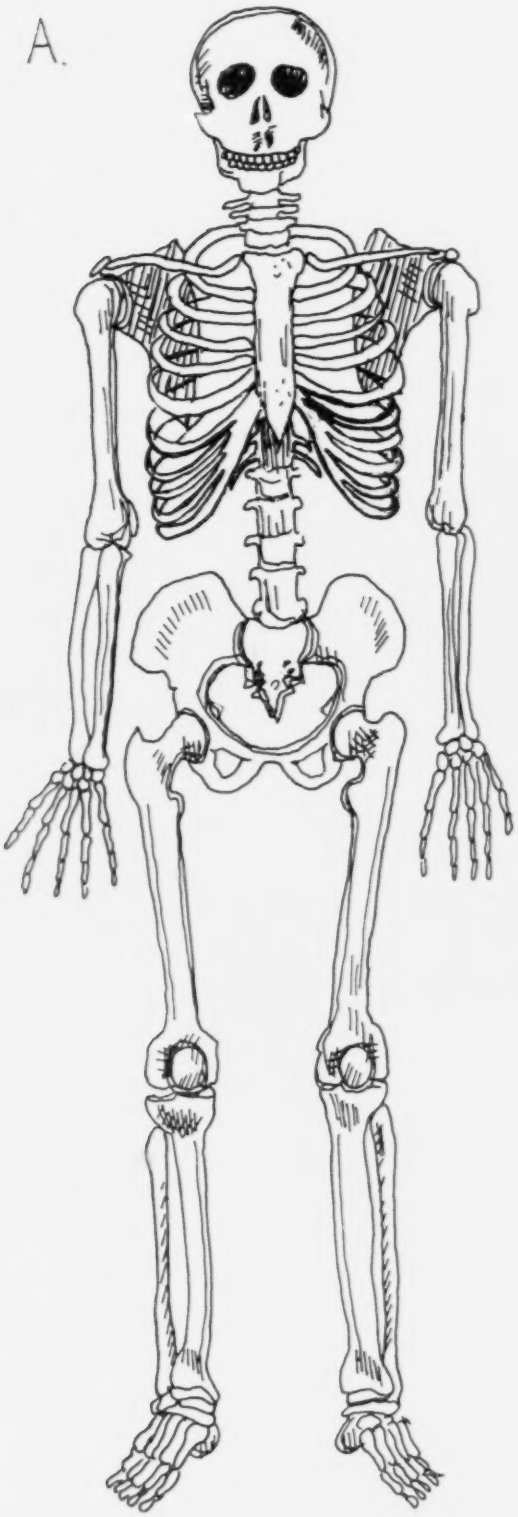
# Digestive System



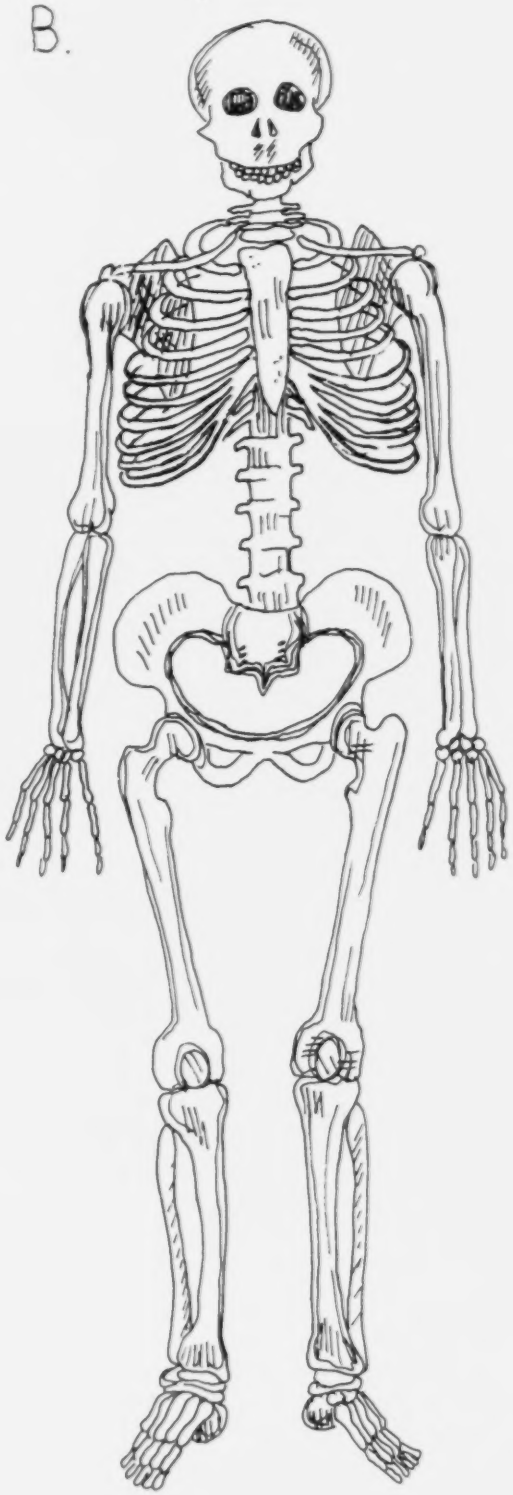
Can you tell the differences between the male and female skeleton? Which is male? Which is female?

The questions on the following page will help you make your decision.

A.



B.



## MALE AND FEMALE SKELETONS

PURPOSE: To enable the student to distinguish between a male and a female skeleton after making some basic measurements, observations, and the use of reasoning.

MATERIALS: Male and female skeletons, or pictures and rules. Use skeletons on the previous page.

PROCEDURE: Carefully study the male and female skeletons. Look for differences between them. Answer the following questions; reach a conclusion.

1. Carefully study diagrams A and B. Note any apparent differences. _____

   _____

   _____

   _____

2. What is the width of the rib cage of skeleton "A"? _____ of skeleton "B"? _____

3. What is the width across the top of the shoulders of skeleton "A"? _____ of skeleton "B"? _____

4. Which skeleton is wider across the pelvis?
   Skeleton A _____ Skeleton B _____

5. Carefully study the openings in the pelvis. Measure the openings. What is the measurement of "A"? _____ for "B"? _____

6. Would a male normally have larger shoulders than a female? _____ Why? _____

   _____

   _____

7. Would a female have a larger pelvis and pelvis opening than a male? _____ Why? _____

   _____

   _____

8. Which skeleton is male _____ Which skeleton is female? _____

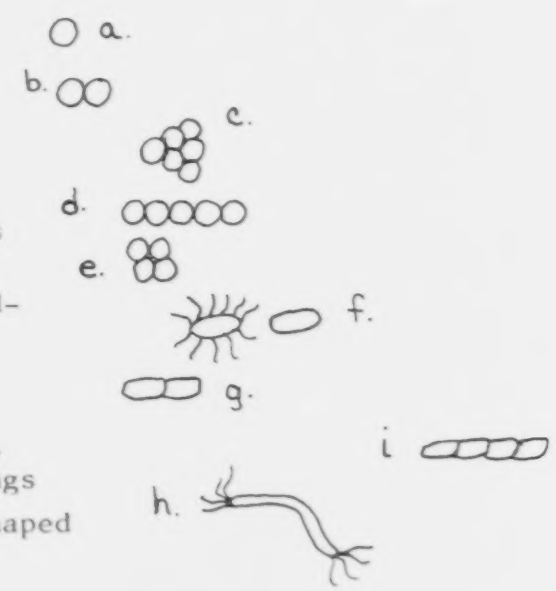
## SHAPES AND FORMS OF BACTERIA

PURPOSE: This exercise was designed to acquaint students with the various shapes of bacteria, and to aid them in remembering the ways in which bacteria group.

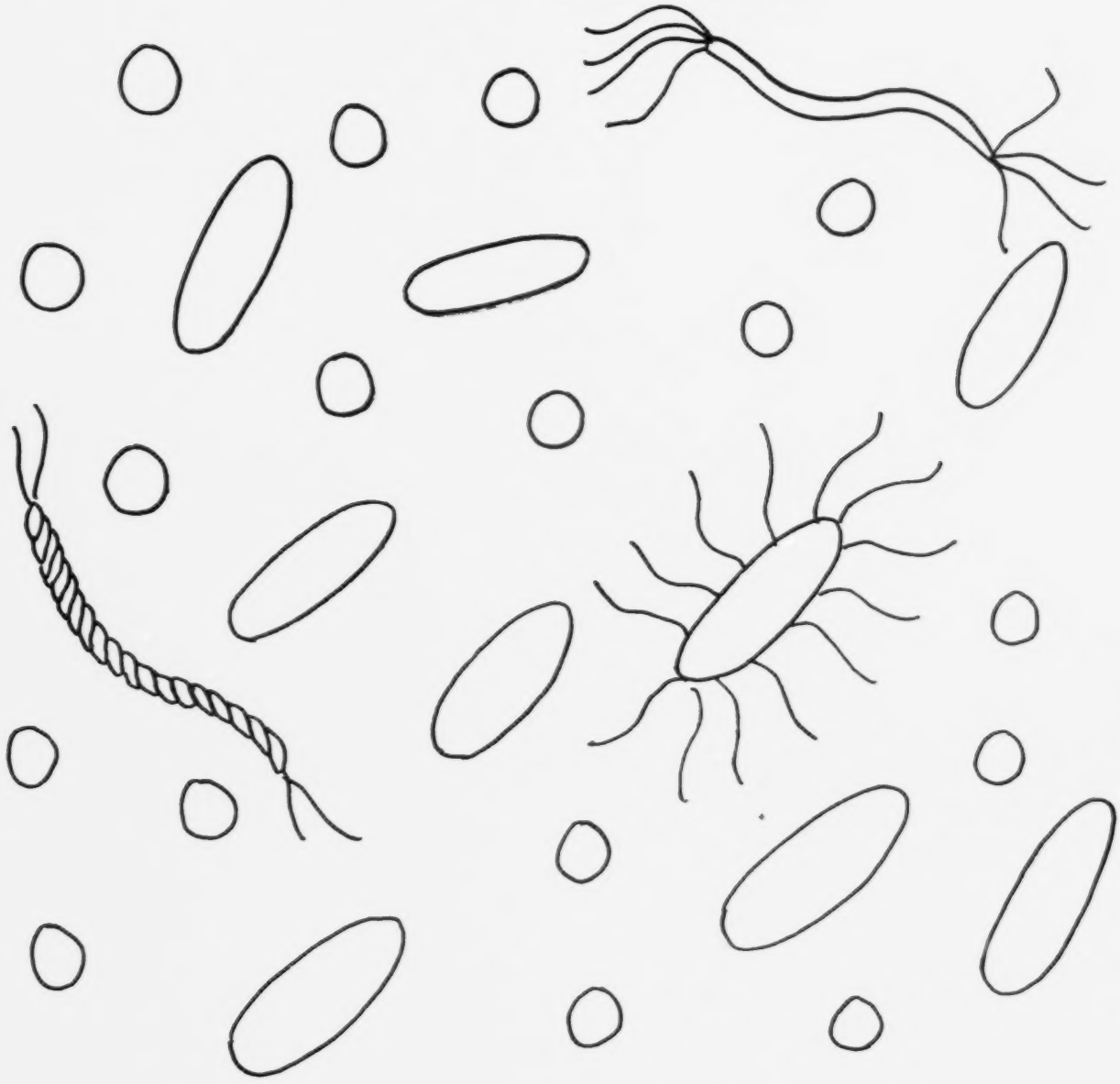
MATERIALS: A sample sheet similar to the one given on the next page, a pair of scissors, and glue (optional).

PROCEDURE: Cut out all the bacteria shapes given on the sample sheet; then make the following forms. (NOTE: In cutting out the flagellated forms, round out the flagella.) Cut-out bacteria may be glued to another piece of paper. This can be done as a homework or extra credit project.

a. Coccus - single round shape
b. Diploccoccus - cocci in pairs
c. Staphlococcus - cocci in clusters
d. Streptococcus - cocci in strings
e. Tetrad - cocci in groups of four
f. Bacillus - rod or cylindrical shaped
g. Diplobacillus - bacilli in pairs
h. Streptobacillus - bacilli in filaments or strings
i. Spirillus - corkscrew shaped bacteria



## SHAPES AND FORMS OF BACTERIA



DIRECTIONS: Cut out the bacteria and make the following forms: Coccus, diplococcus, staphlococcus, streptococcus, tetrad, bacillus, diplobacillus, streptobacillus, spirillu.

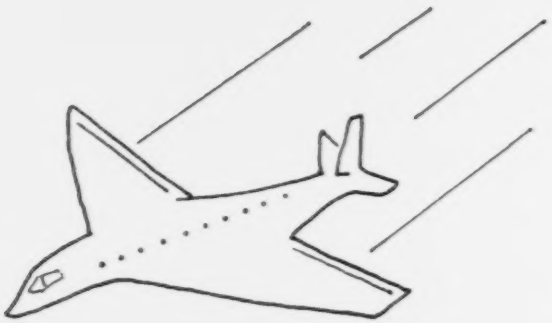
Many human and animal diseases are caused by bacteria similar in shape to those on this page. A type of pneumonia is caused by a diplococcus. A certain strain of staphlococcus gives acne while some streptococci are responsible for strep throat. Bacillus anthracis causes anthrax, a serious disease of cows. The black plague was also caused by a bacillus. Make your own list of bacteria caused diseases.

## GIVE AN AWARD

PURPOSE: To give recognition, to instill confidence, and to promote the study of science.

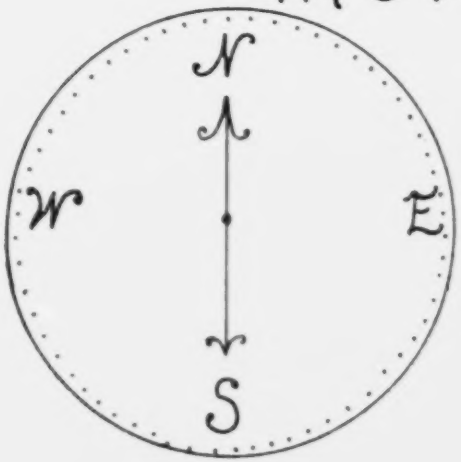
MATERIALS: Certificate, made or purchased. If made, the award can be decorated with a ribbon or a gold seal.

PROCEDURE: At the end of a unit of study or for progress shown during the year, issue awards. The wording of the awards can be changed to fit the student. Use the awards not only to recognize excellence, but also as an inducement to do better work and as a morale builder.



_____ is

moving in the right direction



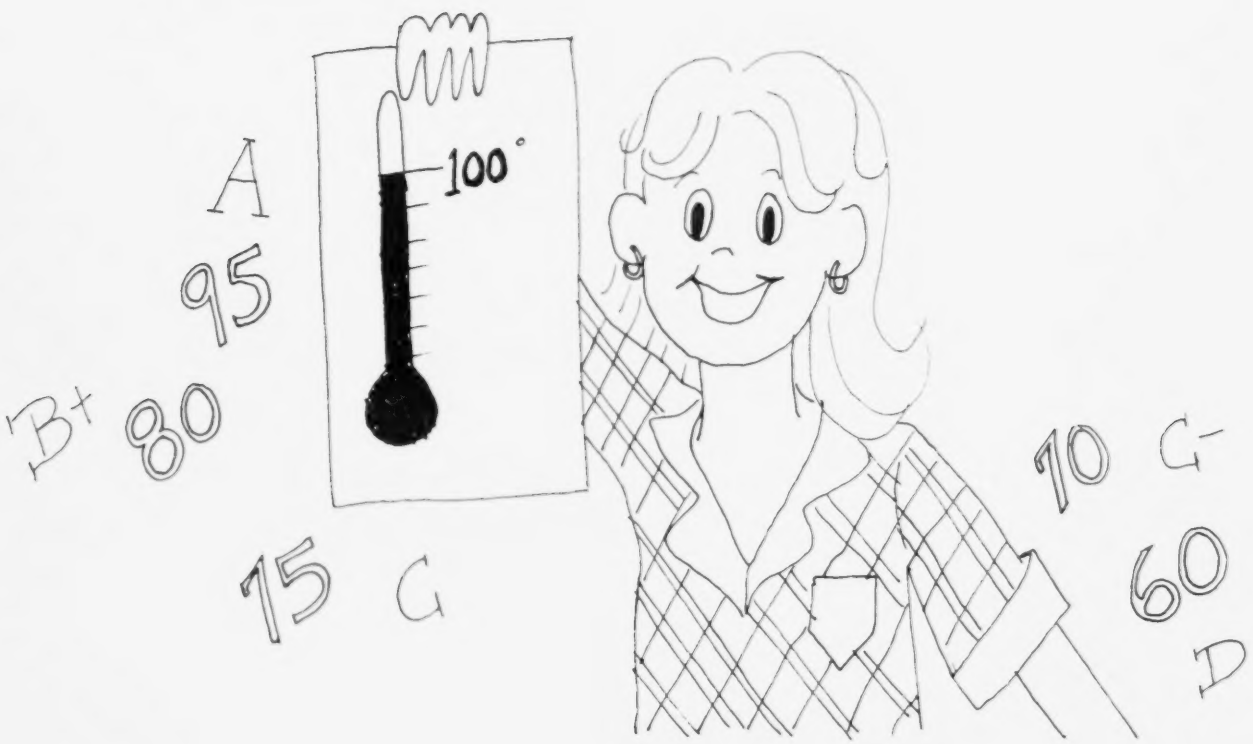

_____
teacher

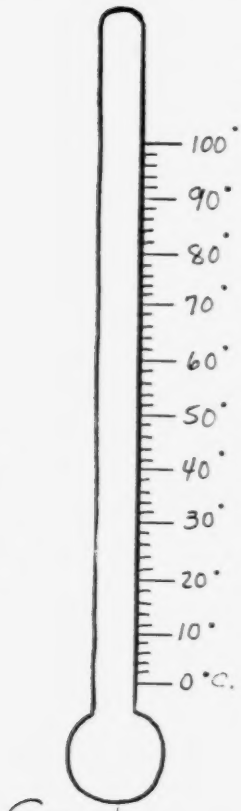
## WATCH MY GRADES RISE

PURPOSE: This is a unique way to chart progress and encourage improvement in grades.

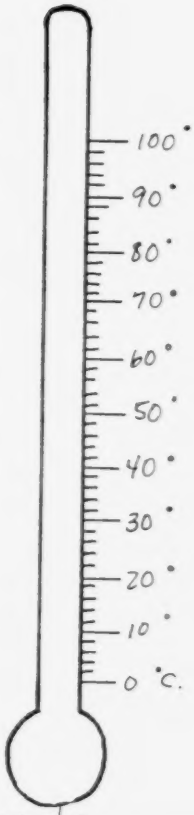
MATERIALS: Record sheet with thermometers, colored pen or pencil, red preferred.

PROCEDURE: Students record their test scores on thermometers. The red ink signifies the grade. Students know instantly whether their grades are going up or down.






Grade _____

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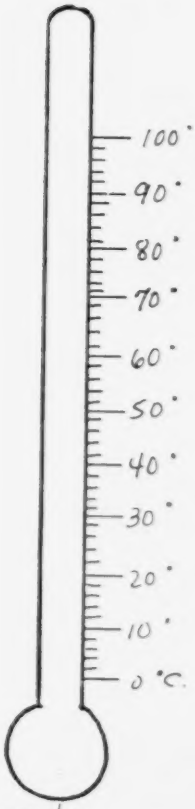


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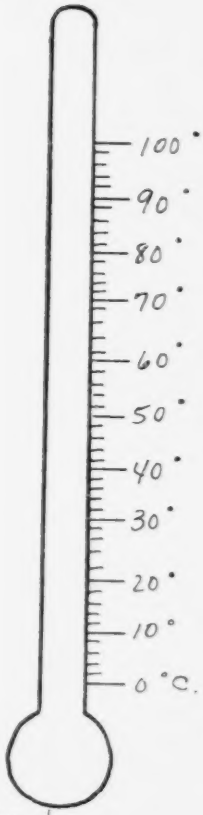


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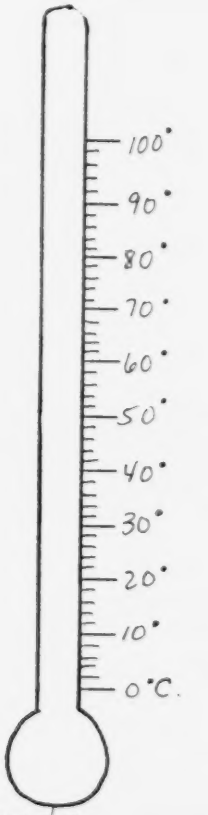


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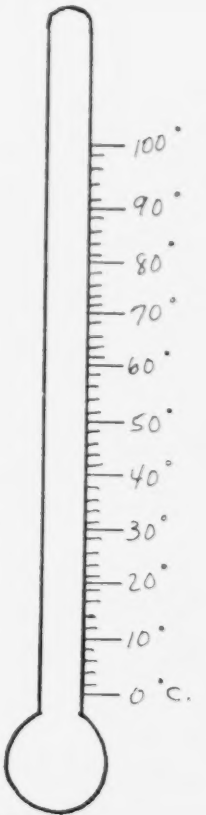


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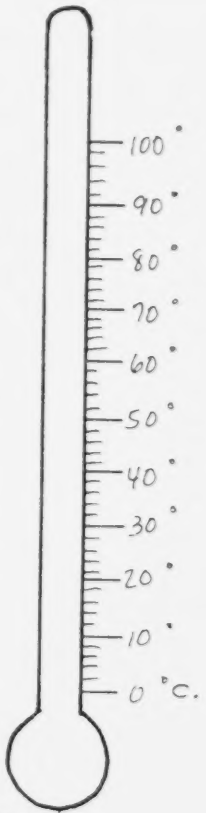


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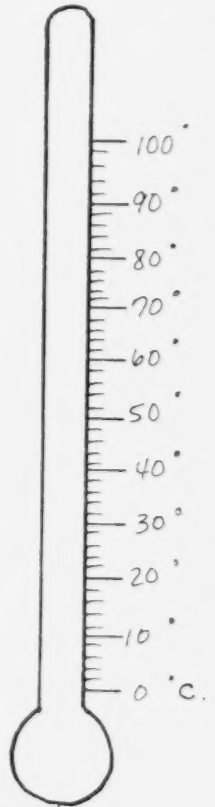



Grade _____

# ANSWER KEY

Page 4: Match the Tissue to the Organ

| Tissue | Organ |
|---|---|
| 1. Lung Tissue | D. Lung |
| 2. Bone Tissue | C. Bone |
| 3. Muscle Tissue | E. Leg Muscle |
| 4. Blood | A. Beaker of Blood |
| 5. Nerve Cells | B. Brain |
| 6. Heart Muscle | F. Heart |

Page 6: Do You Know What You Eat?

1. Answers will vary.
2. Answers will vary.
3. Water, preservatives, coloring, retardants, artifical vitamin C.
4. Answers will vary.
5. Orange juice, fresh fruit.

6.-13. Answers will vary.

Page 7: What Is Sickle Cell Anemia?

1. Carry food and oxygen to cells. Remove carbon dioxide and wastes from cells.
2. Sickles.
3. Normal cells.
4. Normal cells.
5. Tired. Cannot get enough food and oxygen to carry on normally.
6. Yes. Because of their shape they may become clogged.

Page 10: Blood Components

1. Red Blood Cells — Carry food and oxygen to cells, remove wastes.
2. White Blood Cells — Fight infections.
3. Platelets (thrombocytes) control bleeding.

Page 50: Digestive System

| | |
|---|---|
| 1. Small intestine | 6. Rectum |
| 2. Salivary glands | 7. Large intestine |
| 3. Esophagus | 8. Liver |
| 4. Stomach | 9. Gall Bladder |
| 5. Appendix | 10. Pancreas |

Page 51: Digestive System

| | |
|---|---|
| 1. Salivary glands | 6. Gall bladder |
| 2. Esophagus | 7. Small intestine |
| 3. Stomach | 8. Large intestine |
| 4. Liver | 9. Rectum |
| 5. Pancreas | 10. Appendix |

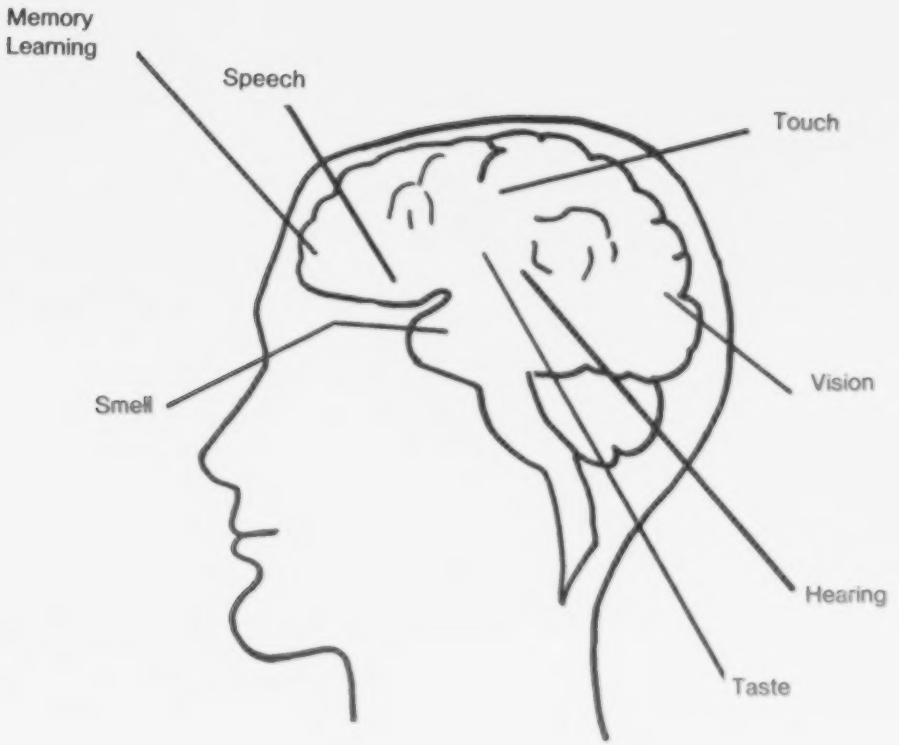
Page 53: Male and Female Skeletons

1. Answers will vary.

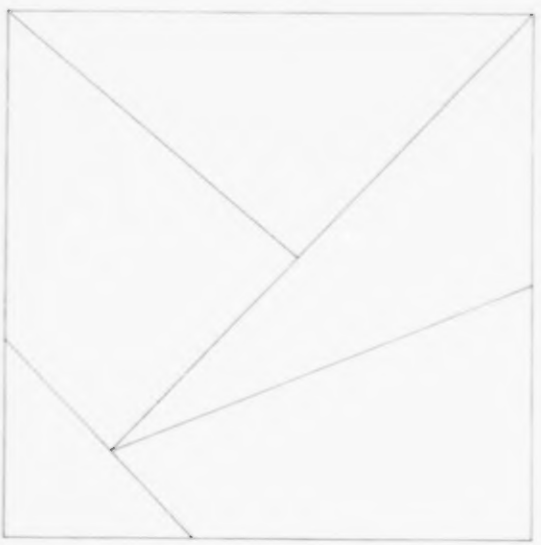
2.-7. Answers will vary according to individual measurements.

8. Yes. Males are generally larger and built stronger.
9. Yes. To make childbirth easier.
10. A is male.
11. B is female.

Page 16: Brain Map
Answer Key

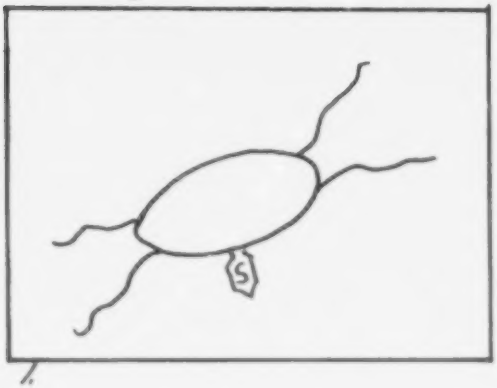



Page 32: Learning by Trial & Error Solution

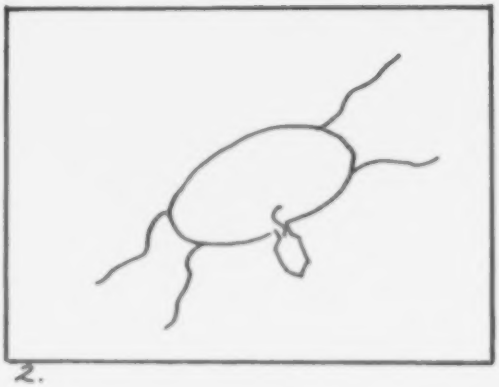


## ANSWER KEY

Page 38: Virus Invasion of a Bacterial Cell



1.



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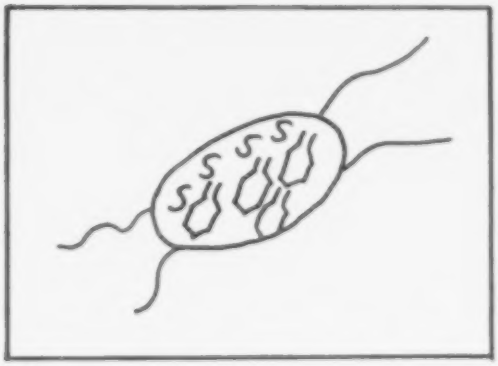

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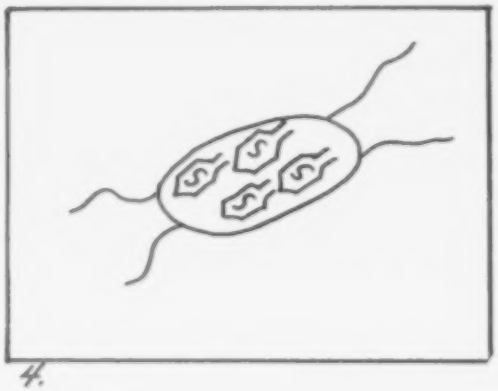

4.

5.

Page 40: Magnificent Journey

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C | D | G | F | B | A | J | H |
| K | N | I | L | O | P | M | E |

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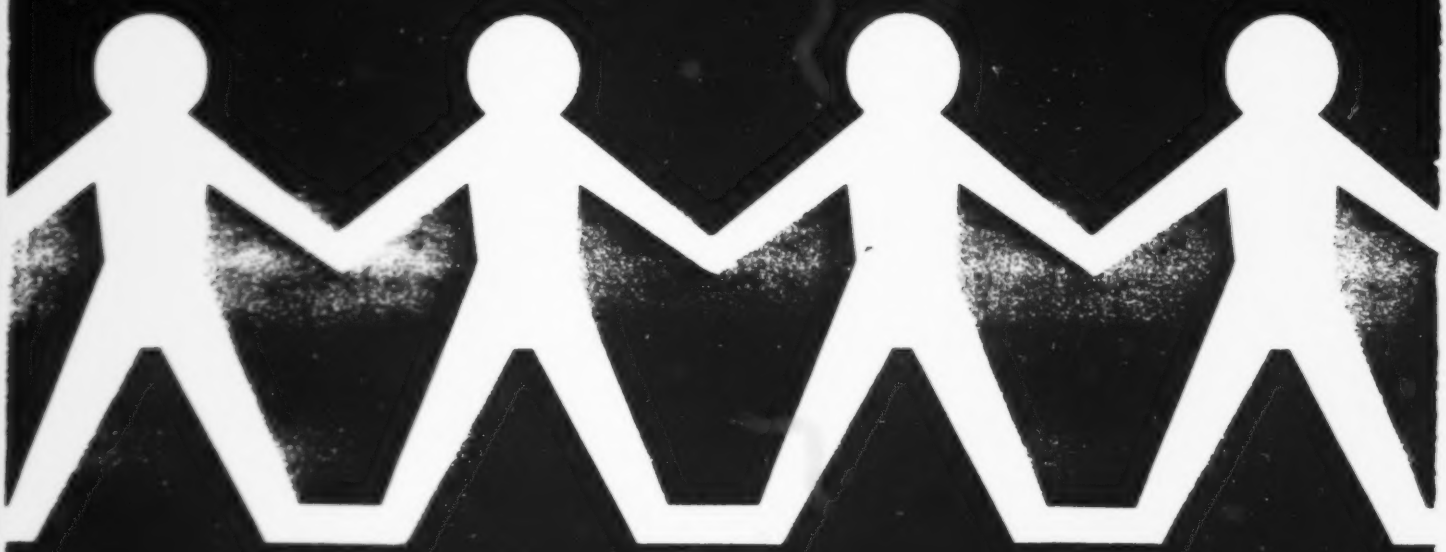

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